PRIVY COUNCIL

MEDICAL RESEARCH COUNCIL

MEMORANDUM

No. 24

The Causes of Blindness in England and Wales

BY

ARNOLD SORSBY

WI941
069
950

LONDON: HIS MAJESTY'S STATIONERY OFFICE

1950

PRICE 1s. 6d. NET

M.C. MIGEL LIBRARY
AMERICAN PRINTING
HOUSE FOR THE BLIND

PRIVY COUNCIL

MEDICAL RESEARCH COUNCIL MEMORANDUM

No. 24

THE CAUSES OF BLINDNESS IN ENGLAND AND WALES

BY

ARNOLD SORSBY

LONDON: HIS MAJESTY'S STATIONERY OFFICE

1950

Digitized by the Internet Archive
in 2016

https://archive.org/details/causesofblindnes00arno

MEDICAL RESEARCH COUNCIL

The Rt. Hon. Viscount Addison, K.G., M.D., F.R.C.S. (*Chairman*)
Sir George Schuster, K.C.S.I., K.C.M.G., C.B.E., M.C. (*Treasurer*)
Group-Captain C. A. B. Wilcock, O.B.E., A.F.C., M.P.
Professor C. A. Lovatt Evans, D.Sc., F.R.C.P., F.R.S.
Professor R. A. Peters, M.C., M.D., F.R.S.
Professor J. H. Gaddum, Sc.D., M.R.C.S., F.R.S.
Professor Sir Frederick Bartlett, C.B.E., M.A., F.R.S.
Professor Sir Howard W. Florey, D.Sc., M.D., F.R.S.
Professor Geoffrey Jefferson, C.B.E., M.S., F.R.C.S., F.R.C.P., F.R.S.
N. Hamilton Fairley, C.B.E., D.Sc., M.D., F.R.C.P., F.R.S.
Sir Percival Hartley, C.B.E., M.C., D.Sc., F.R.S.
Professor J. McMichael, M.D., F.R.C.P.
H. P. Himsworth, M.D., F.R.C.P. (*Secretary*)
A. Landsborough Thomson, C.B., O.B.E., D.Sc. (*Second Secretary*)

HV1971
S069
1950
Copy two

CONTENTS

PAGE

I. INTRODUCTION
The Number of Blind Persons: Census Returns, 1851–1911 .. 1
The Causes of Blindness in the Past 1
The Blind Register, 1920 2

II. THE PRESENT SURVEY
Material 5
Methods 5

III. ANALYSIS OF BLIND CERTIFICATES
Blindness from the Same Cause in Both Eyes 8
Degrees of blindness 8
Age distribution 8
Age at onset of eye trouble and of blindness 9
Interval between onset of blindness and registration 10
The causes of blindness and their relative significance 10
Principal causes of blindness in the different age groups .. 11
Prognosis 11
Sex distribution 12
Occupational differences 15
Regional differences 16
Blindness from a Different Cause in the Two Eyes 16
Degrees of blindness 16
Age distribution 16
Causes of blindness 17
Prognosis 18
Sex distribution 18
Occupation in industrial accidents 18
Regional differences in the incidence of trauma 19
Sympathetic ophthalmia 19

IV. DISCUSSION
The Present Blind Population 21
Rate of blindness 21
Age distribution 22
Decline in the frequency of blindness in schoolchildren .. 22
Sex distribution 23
Associated mental and physical defect 24
The Changing Background 24
Ophthalmia neonatorum 25
Phlyctenular ophthalmia 26
Interstitial keratitis 26
Other infectious disease in childhood 26
Congenital, hereditary and developmental defects 26

PAGE

The Causes of Blindness Today 26
Major causes 26
Intermediate causes 27
Lesser causes 28
Conclusions 28
Problems and Prospects 28
The definition of blindness 28
The burden of visual defect 30
The past and its lessons 31

ACKNOWLEDGEMENTS 33

REFERENCES 34

APPENDICES 35
I. Form B.D.8. 35
II. Summary of Data for 1948 39
III. Tables A and B .. .. .. *facing p.* 42 INSETS

THE CAUSES OF BLINDNESS IN ENGLAND AND WALES

A SURVEY BASED ON 19,149 CERTIFICATES OF BLINDNESS

BY

ARNOLD SORSBY, F.R.C.S.

I. INTRODUCTION

The Number of Blind Persons: Census Returns, 1851–1911

RETURNS at the decennial censuses from 1851 to 1911 recorded the number of blind people in the country. The figures were based on a declaration of blindness by the affected individual or someone responsible for him, and their value is obviously limited, particularly as blindness (apart from total blindness) is a somewhat vague term. For what they are worth the returns in these successive censuses indicated a steady decline in the frequency of blindness in the population of England and Wales, the rate falling progressively from 102 per 100,000 in 1851 to 73 in 1911 (Table I).

TABLE I

Census Returns on the Number of Blind in England and Wales, 1851–1911

Year	*Population*			*Number of blind*			*Rate per* 100,000		
	Male	*Female*	*Total*	*Male*	*Female*	*Total*	*Male*	*Female*	*Total*
1851	8,781,225	9,146,384	*17,927,609*	9,713	8,593	*18,306*	*111*	*94*	*102*
1861	9,776,259	10,289,965	*20,066,224*	10,249	9,103	*19,352*	*105*	*88*	*96*
1871	11,058,934	11,653,332	*22,712,266*	11,378	10,212	*21,590*	*103*	*88*	*95*
1881	12,639,902	13,334,537	*25,974,439*	12,048	10,784	*22,832*	*95*	*81*	*88*
1891	14,052,901	14,949,624	*29,002,525*	12,281	11,186	*23,467*	*87*	*75*	*81*
1901	15,728,613	16,799,230	*32,527,843*	13,136	12,181	*25,317*	*83*	*72*	*78*
1911	17,445,608	18,624,884	*36,070,492*	13,257	13,079	*26,336*	*76*	*70*	*73*

The detailed returns for 1871 to 1911 also suggest that the reduction in the incidence of blindness was fairly evenly effective in the two sexes and in the different age groups. However, there are such serious fallacies inherent in census returns on blindness that estimations based on them may be grossly misleading. Though such returns are still made in many countries, in this country they have been discontinued since 1911.

The Causes of Blindness in the Past

There are no adequate statistical data on the causes of blindness in the past. The most valuable are the returns for the inmates at the Liverpool School for the Indigent Blind founded in 1791. Returns up to 1819 showed that "two thirds of

those who apply for relief [at the Liverpool Institution] have lost their sight by smallpox" (Blane, 1819). Table 2 gives the distribution of causes in 1,709 inmates admitted to the Liverpool Institution between its foundation in 1791 and 1872. Again, the high incidence of blindness from smallpox, which accounted for 260 of the 1,709 admissions over the whole period 1791–1872, is notable but it is clear that by 1872 smallpox was no longer responsible for two thirds of all blindness.

TABLE 2

Causes of Blindness in Inmates of the Liverpool School for the Indigent Blind, 1791–1872

Cause of blindness	*Number*
Blind from birth	141
Smallpox	260
Inflammation	522
Cataract	169
External injury	209
Defect of optic nerve	174
Amaurosis	69
Imperfect organization	29
Loss of sight after:	
Fever	26
Measles	15
Convulsions	6
Loss of sight at sea	9
Loss of sight by gradual decay	9
Causes not mentioned or imperfectly described	71
	1,709

Well before the end of the century smallpox had ceased to be a significant cause of blindness throughout England and Wales. In the statistics published at that time ophthalmia neonatorum had become the leading cause and in 1889 it was held responsible for the blindness of some 7,000 persons (Royal Commission, 1889). In a collective survey conducted by the Ophthalmological Society in 1884 the blindness of some 30 to 41 per cent of inmates at different blind schools and institutions was attributed to ophthalmia neonatorum. In 1888 an incidence of the same order was reported by Snell at the Sheffield School for the Blind, and some twenty years later the position had not altered much: "A careful consideration of the records for successive years does not even point to a diminution in more recent times" (Snell, 1907).

The almost total eradication of ophthalmia neonatorum as a cause of blindness is one of the outstanding ophthalmological achievements of the present century.

The Blind Register, 1920

Consequent on the Blind Persons Act of 1920, with its statutory advantages to the registered blind—such as the Old Age Pension on reaching the age of 50 and Domiciliary Assistance—a register of blind persons was instituted. At first all that was required for registration was a certificate from any medical practitioner that the patient was blind. Registration has, however, become more stringent with time and for some years now most local authorities, which are the bodies responsible for the registration of blind persons, have accepted only certificates

from ophthalmologists. For the past fifteen years or so, most authorities have in addition insisted on registration being effected on a special form (B.D.8., Appendix 1, p. 35). On this form there are entered particulars of the applicant's degree of vision, the diagnosis and prognosis and recommendations for treatment.

TABLE 3

Number of Registered Blind in England and Wales 1919–1948

Year	*Number on blind register*
1919	25,840
1920	30,785
1921	34,894
1923	36,518
1925	42,140
1927	46,822
1929	52,727
1931	60,598
1933	63,408
1936	67,534
1938	71,875
1940	74,418
1942	75,306
1943	76,507
1944	76,145
1945	75,758
1946	75,897
1947	76,004
1948	77,390

The number of people on the Blind Register rose steeply year by year from 25,840 in 1919 to 74,418 in 1940. Since then the figure has remained almost stationary, and in 1948 it stood at 77,390 (Table 3). It may be taken that by 1940 registration had become as fully effective as it can be under conditions in

TABLE 4

Annual Number of New Cases Registered as Blind in England and Wales, 1937–1948

Year	*No. of new cases of blindness*
1937	7,897
1938	8,377
1939	8,539
1940	7,117
1941	6,382
1942	7,062
1943	7,079
1944	6,110
1945	6,034
1946	6,633
1947	6,863
1948	7,586

which there is no compulsion on a blind person to seek it, though even now it may be short by as much as 15 to 20 per cent.

The trend in blind statistics is best seen in the number of new registrations effected year by year rather than in the total number on the Register, for the total number in any year depends on the balance between new admissions and eliminations as a result of death (or, less frequently, decertification) during the year. The number of new cases is available only since 1937 and is shown in Table 4, from which it can be seen that of late some 6,000 to 8,000 new cases have been registered each year. These registrations, made mainly on certificates from ophthalmologists, are valuable material for assessing the frequency of the different causes leading to blindness and also for studying any changes over successive years in their relative significance. No such full study has yet been undertaken. Two significant studies have come from Scotland: in 1942 Marshall and Seiler recorded an analysis of 3,219 blind certificates for Glasgow and the South West of Scotland from 1929 to 1935, and R. M. Dickson in 1946 reported on 4,078 blind certificates for the rest of Scotland from 1930 to 1938. For England and Wales only general surveys are available by the Prevention of Blindness Committee (1938) on 5,298 certificates, and by the Northern Counties Association for the Blind (1938) on 10,000 certificates.

II. THE PRESENT SURVEY

Material

THE present study deals with the B.D.8 certificates of 19,149 persons accepted as blind within the meaning of the Act. They include almost all B.D.8 certificates held by the London County Council and the Middlesex County Council up to approximately the end of 1943, covering essentially the years 1933–43, though a few are of earlier date. Certificates, representative of urban areas, were obtained also from the Durham County Council (1934–43), the County Boroughs of Leeds (1933–38), Liverpool (1934–41), Manchester (1934–39), and Sheffield (1933–44). Certificates, representative of rural areas, came from Cambridgeshire (1934–46), Cumberland (1934–46), Northamptonshire (1934–45), Westmorland (1933–46), Worcestershire (1934–46), and the North Riding of Yorkshire (1934–46). For Wales certificates were obtained from the Counties of Flintshire (1935–46), Glamorganshire (1934–47), and Pembrokeshire (1938–46). At all centres some records were incomplete—especially those compiled during the war years—and were discarded for the purpose of the present analysis. At some centres, certificates only of those still on the Register were available; at others the files included certificates of those whose names had been removed from the Register owing to death. The 19,149 certificates are therefore not entirely drawn from the 76,507 blind people on the Register in 1943; they reflect not so much the present constitution of the blind population as the conditions revealed by the registration of some 70,000 to 80,000 blind persons during (mainly) 1933 to 1943.

The material has further limitations. In the first place, it is not a sample of the total number of blind in the different areas, for registration as a blind person is not compulsory. Secondly, even had the total number of blind for a particular area been known, it would have been impossible to calculate the rate of blindness, as owing to the recent war the population in the different areas was fluid during almost half the period covered. The most, therefore, that can be claimed for the present study is that it gives a fair sample for the country as a whole of the causes seen in those registered essentially between 1933 and 1943. An attempt to assess the relative weight of the different causes in London and Middlesex on the one hand, and urban and rural areas of England and of Wales on the other, was largely unsuccessful. All that proved possible within the limits of the present study was an overall survey. Finer deductions will become possible only when full annual returns of the blind population can be related to known or estimated populations for the different parts of the country.

Methods

In dealing with this mass of certificates, issued by many different hands, allowance had to be made for individual vagaries. Clear distinctions were drawn between the factual statement made by the examiner, his interpretation of the findings, and the hearsay evidence incorporated in the certificate. The factual data could not but be accepted, the interpretation occasionally required modification, and the hearsay evidence was given little weight. It was the unreliability of the hearsay evidence that was the main reason why little could be done to correlate aetiological factors with occupation or age of onset of eye trouble or even age of onset of blindness.

It was obvious that three factors conspired to make the entries under aetiological diagnosis somewhat confused:

(*a*) In many cases aetiological diagnosis is genuinely difficult, as anyone with experience in blind certification knows. Frequently the patient is seen by the examiner only on the one occasion, and a reliable history cannot always be elicited. In its absence it is not always possible to decide whether a shrunken eye is the result of uveitis, primary glaucoma, secondary glaucoma, operation, injury or other possible causes. Less extreme examples constantly occur.

(*b*) The certificate, though in general excellent, contains several weaknesses. Headings (Form B.D.8., p. 35) such as A.3 (Other errors of refraction), A.6 (Other primary ocular defects), A.9 (Other congenital and undetermined causes), B.11 (Septicæmia, chronic; auto-toxic, focal sepsis), and B.12 (Other infections and bacterial disease) are all rather vague, and an amazing variety of clinical conditions were ascribed to these aetiological factors. Another defect in the certificate is the lack of a heading covering the central fundus degenerations of the elderly. This group of lesions—a not inconsiderable one—was scattered over a whole series of aetiological causes of doubtful relevance. In the present analysis a modified Section 3 (Causes of eye defects) was, therefore, substituted in order to present a clearer aetiological classification (Table A, p. 44). Subsections A.3 (Other errors of refraction), A.9 (Other congenital and undetermined causes), B.5 (Local infection of coats of eye), B.10 (Septicæmia, acute), B.11 (Septicæmia, chronic; auto-toxic, focal sepsis), and B 12 (Other infections and bacterial diseases) were eliminated, and an additional section, D.9 (Senile) was introduced for the classification of the central fundus lesions seen in the elderly. Subsection E (No information obtainable) was modified to E.1 and E.2: under E.1 were grouped those cases in which only an anatomical diagnosis was possible (such as an opaque cornea, a choroidal or retinal lesion of unknown origin, and most examples of iritis and optic atrophy); E.2 covered those cases in which a competent examiner could make neither an anatomical nor aetiological diagnosis.

(*c*) As was to be expected, the competence of different examiners varied considerably. In general, certificates completed by full-time ophthalmologists left little to be desired, whereas those completed by part-time ophthalmologists gave considerable trouble, as the factual information supplied was frequently too incomplete to allow an adequate aetiological diagnosis.

Several other aspects of the analysis require mention:

(*a*) The entries in the certificates were very uneven in Sections 4 and 5. In Section 4, where remarks are invited, some examiners gave most useful information, particularly on genetic aspects, but most had no entries at all. Section 5, requesting information on associated conditions, was generally incomplete. No valid use could be made of the data in either of these sections.

(*b*) In Section 6 (Diagnosis and summary of case) there were occasionally discrepancies with the main section of the certificates.

(*c*) Section 7, dealing with treatment and prognosis, appeared to present difficulties to many examiners. It seems that under the heading of history of treatment the subheadings (2) *None*, (4) *Medical, unsuccessful* and (5) *Medical uncompleted* were often used as interchangeable entries. Under D some examiners showed more optimism than others, regarding most patients as falling under (1) *Yes*, (amenable to treatment which would remove them from the blind category); others used (2) *No*, (3) *Doubtful*, and (4) *Yes, but inadvisable on general grounds*, almost exclusively and frequently interchangeably.

In stressing these difficulties it is only proper to emphasize that no criticism of individual examiners is implied. It is obvious that there is need of some modification of the certificate in the light of experience in its use during the last fifteen years. Changes are all the more necessary if statistics collected from widely scattered sources are to be made as useful as possible.

The total of 19,149 cases fell into two distinct groups: 17,430 certificates (91·0 per cent) showed the same cause of blindness in the two eyes, while 1,719 (9·0 per cent) showed a different cause for the two eyes.

Analysis of this latter group presented many difficulties in classification. It would give an undue weight to this group to study the two eyes separately and combine the duplicated number with the major group in which the same cause is operative in both eyes. If only the cause operative in the second eye is studied, on the ground that this was the factor responsible for the patient becoming blind, the disadvantage of duplication is eliminated but the cause of blindness in the first eye is overlooked. To take into account only the eye first blinded would be to introduce a group of people who are not blind, since monocular blindness does not qualify for registration; moreover nothing is known of the extent of monocular blindness in the general population. The alternative of combining this group with a duplicated blind population, in which the same cause operated in both eyes, has the disadvantage of combining two dissimilar groups. For these reasons the 9 per cent blinded by a different cause in the two eyes were studied separately from the major group.

Table A and B (Appendix III, p. 44) set out the causes of blindness in these two groups.

III. ANALYSIS OF BLIND CERTIFICATES

Blindness from the Same Cause in Both Eyes

THIS group, consisting of 17,430 persons, accounted for 91·0 per cent of the total of 19,149 certificates studied.

DEGREES OF BLINDNESS

As can be seen from Table 5, 10·0 per cent of the blind population are totally blind, having no perception of light, and 19·8 per cent have perception of light only. Thus some 30 per cent of the blind population are, for practical purposes, blind in the full meaning of the term. Another 50 per cent have vision enabling

TABLE 5

Visual Acuity at Registration for Blindness

Visual acuity	*Persons*	
	No.	*Per cent*
No perception of light ..	1,753	10·0
Perception of light ..	3,453	19·8
Hand movements ..	8,599	49·3
More than hand movements, but less than 3/60 Snellen	1,072	6·2
3/60 Snellen	1,728	9·9
Better than 3/60 Snellen ..	710	4·1
Not stated	115	0·7
Total	*17,430*	*100·0*

them to see hand movements, 6·2 per cent have rather more vision than this but less than 3/60 Snellen, and 14·0 per cent have vision of 3/60 or more. But 3/60 being a merely arbitrary limit, blind statistics give no indication of the prevalence of gross visual defects bordering on blindness.

AGE DISTRIBUTION

From Table 6 it can be seen that as many as 77 per cent of the registered blind are over the age of 50 at the time of registration. Only 0·6 per cent are recorded for the age group 0–4 years but this low percentage does not necessarily prove a correspondingly low incidence of blindness, for many blind infants may not have been registered until later in life. The numbers shown in Table 6 for the age group 5–14 years are, however, likely to be reasonably accurate, since blind children of school age are under the supervision of the Education Authorities and few now fail to be registered. The figures in Table 6 suggest an increasing frequency of blindness with increasing age and it can be accepted that the incidence of blindness rises steadily up to the age of 50 and then sharply in this and successive age groups with the striking result that in the age group of 70 years and over there are concentrated no less than 39·5 per cent of the blind population, though that age group contains only 4·2 per cent of the general population (1931 Census).

TABLE 6

Age at Registration for Blindness
(With Age Distribution of General Population, 1931 Census)

Age (years)	*Blind persons*		*Percentage distribution of general population, 1931 Census*
	No.	*Per cent*	
Under 1	3	0·0	7·5
1–4	98	0·6	
5–14	213	1·2	16·3
15–19	397	2·3	8·6
20–29	637	3·7	17·2
30–39	905	5·2	14·7
40–49	1,409	8·1	13·1
50–59	2,310	13·3	11·1
60–69	4,235	24·2	7·3
70 and over	6,893	39·5	4·2
Not stated	330	1·9	—
Total	*17,430*	*100·0*	*100·0*

AGE AT ONSET OF EYE TROUBLE AND OF BLINDNESS

We can be certain about the age on registration, but data on the age at onset of the eye trouble ultimately leading to blindness and data on age at onset of blindness depend on the recollection of the patient. Nevertheless, though the figures are of only doubtful statistical validity, there is no reason to doubt the broad outlines of the picture they present. Table 7, which brings out the

TABLE 7

Distribution of Blind Population throughout the Different Age Groups

Age (years)	*Percentage distribution of blind population at*		
	Registration	*Reputed onset of eye trouble*	*Reputed onset of blindness*
Under 1	1·8	26·6	10·1
1–4			
5–14			
15–49	19·3	18·0	16·7
50 and over	77·0	48·2	63·9
Not stated	1·9	7·2	9·3
	100·0	*100·0*	*100·0*

salient features, shows that, though the blind are concentrated in the age group of 50 years and over (Column 2), the causes of blindness operate most strongly in late and early life. At one extreme there appear to be one quarter of the blind population destined to blindness from early life (Column 3), and rather less than half of these actually become blind during early life (Column 4). At the other extreme one half of the total blind population do not develop trouble leading to blindness till after the age of 50 years (Column 3). The middle years,

15–49, though contributing their quota of diseases leading to blindness, appear to be relatively less significant than the two extremes of life.

INTERVAL BETWEEN ONSET OF BLINDNESS AND REGISTRATION

The mean age at registration was as high as 60·7 years, but it seems certain that registration during the period under review dealt to a considerable extent with those who had become blind in years gone by rather than with a recently blinded group of people. For example, no less than 60 per cent of persons blinded by bilateral intraocular tumour, which for all practical purposes is bilateral glioma seen in infants, registered after reaching the age of fifteen. The figures in Table 8 suggest a similarly long interval between the onset of

TABLE 8

Percentage Age Distribution at Registration of Causes of Blindness Responsible for more than 2·5 per cent of Cases

Causes	*Percentage of cause at age:*										
	0–4	5–14	15–19	20–29	30–39	40–49	50–59	60–69	70 *and over*	*Not stated*	*Tota*
Cataract	—	0·0	—	0·0	0·1	1·2	5·1	22·4	69·3	1·8	*100*
Glaucoma ..	—	—	0·0	0·1	0·5	2·8	10·3	31·0	53·1	2·1	*100*
Myopia	—	0·2	0·7	1·9	5·6	12·5	24·0	32·0	21·5	1·5	*100*
Congenital, hereditary and developmental defects ..	3·5	7·7	10·4	12·9	14·2	14·9	15·7	12·5	6·2	2·0	*100*
Syphilis:											
Congenital ..	0·3	1·2	5·6	13·4	14·6	19·7	16·6	18·5	8·7	1·3	*100*
Acquired ..	—	—	0·5	1·4	10·3	23·9	28·8	23·4	9·8	1·9	*100*
Senile macular degeneration ..	—	—	—	—	—	0·2	1·4	15·1	81·0	2·3	*100*
Iritis and iridocyclitis	—	—	1·1	3·2	6·5	12·1	19·4	30·2	26·1	1·3	*100*
Optic atrophy ..	1·3	1·5	2·4	5·0	6·5	10·9	14·3	28·0	27·9	2·1	*100*
Ophthalmia neonatorum	2·3	2·9	13·8	14·7	15·0	18·6	13·2	11·3	5·21	2·7	*100*

blindness and registration in the case of ophthalmia neonatorum and the group of congenital, hereditary and developmental diseases—also largely diseases of infancy and childhood. Some interval was also apparent in the case of other diseases belonging essentially to early life, such as meningitis, congenital syphilis, and the specific fevers.

THE CAUSES OF BLINDNESS AND THEIR RELATIVE SIGNIFICANCE

Table A (p. 44) and Table 9—show that four affections are responsible for no less than 58·7 per cent of all blindness: the group of congenital, hereditary, and developmental origin, classified under A.1, for 9·9 per cent; myopia (A.2) for 10·8 per cent; glaucoma (A.4) for 13·4 per cent; and primary cataract (A.5) for 24·6 per cent. Of the remaining causes ophthalmia neonatorum contributes 2·6, syphilis 6·7, trauma 1·6, vascular diseases 1·9, diabetes 1·8, and senile macular degeneration 6·4, per cent. Of the more significant affections where only anatomical diagnosis was possible optic atrophy contributed 3·5, iritis and iridocyclitis 4·7, choroidal lesions 1·7, and corneal lesions, 2·3, per cent.

TABLE 9

Causes of Blindness Responsible for more than 2·5 per cent of Cases

Cause	*Per cent*
Cataract	24·6
Glaucoma	13·4
Myopia	10·8
Congenital, hereditary, and developmental defects ..	9·9
Syphilis:	
Congenital	4·3
Acquired	2·4
Senile macular degeneration	6·4
Iritis and iridocyclitis ..	4·7
Optic atrophy	3·5
Ophthalmia neonatorum ..	2·6
All other causes	17·4
	100·0

It would give a false impression, however, to estimate the significance of a cause of blindness exclusively by the number of cases for which it is responsible, for a cause operative in old age, though numerically outstanding, may be much less significant in the total years of blindness it produces. It is impossible to make any exact estimate from this point of view, since the expectation of life of a person blinded in youth is unknown, but undoubtedly the group of congenital, hereditary and developmental defects would become outstandingly first in importance. The importance of myopia, congenital syphilis, ophthalmia neonatorum, iritis and iridocyclitis, and optic atrophy would likewise be increased.

PRINCIPAL CAUSES OF BLINDNESS IN THE DIFFERENT AGE GROUPS AT REGISTRATION

It has already been made clear that the present analysis concerns a population blinded some years previously and that registration was considerably delayed in many cases, especially for those affections operative in early life. Nevertheless, it is interesting to see what were the causes of blindness in the different age groups. From Table 10 it can be seen that recurring causes are the group of congenital, hereditary and developmental defects, myopia, cataract, glaucoma, congenital syphilis and ophthalmia neonatorum. Senile macular degeneration is a significant cause of blindness in the age group of 70 years and over (13·1 per cent). It is noteworthy that optic atrophy, iritis and iridocyclitis, and choroiditis, though giving a substantial quota throughout the different age groups, do not in any particular group contribute as much as 10 per cent of the blind.

PROGNOSIS

Of the total cases only 1,770 (10·2 per cent) were regarded as remediable, with an additional 1,015 (5·8 per cent) regarded as technically remediable but unsuitable for operation on general grounds. The remediable cases were, however, almost entirely concentrated in the cataract group, so that apart from those

TABLE 10

Causes of Blindness Responsible for more than 5 per cent of Cases in any Age Group (Age at Registration)

Cause	*Relative percentages of causes of blindness at age:*					
	0–4	5–14	15–29	30–49	50–69	70 *and over*
Congenital, hereditary and developmental defects ..	59·5	62·5	38·7	21·5	7·4	
Ophthalmia neonatorum	9·9	6·1	12·2	6·4		
Meningitis	6·9					
Optic atrophy	7·9					
Syphilis:						
congenital			13·7	11·1		
Acquired				6·3		
Myopia				14·7	16·1	5·9
Iritis and iridocyclitis ..				6·6	6·2	
Cataract					18·0	43·0
Glaucoma					14·7	18·0
Senile macular degeneration						13·1
All other causes ..	15·8	31·4	35·4	33·4	37·6	20·0
Total	*100·0*	*100·0*	*100·0*	*100·0*	*100·0*	*100·0*

with cataract the blind population is at present largely incurable. From Table 11, which shows the distribution of cataract cases according to prognosis, it would seem that blindness from cataract is frequently a matter of relief not being sought rather than of attempted relief that has failed.

TABLE 11

Prognosis in Cataract

State	*Number*	*Per cent*
Remediable	1,506	35·1
Remediable, but operation inadvisable on general grounds	980	22·8
Doubtful	533	12·4
Not stated	609	14·2
Not remediable	665	15·5
	4,293	*100·0*

SEX DISTRIBUTION

Numbers

Of the 17,430 blind persons 9,875 were women—2,320 more women than men. The excess of women over men is, however, confined entirely to the age groups of 50 years and over. Below those age groups the number of women registered as blind is consistently less than that of men. This excess of women over men in the higher age groups is paralleled in the general population. Table 12 shows the actual sex distribution of blind persons at the time of registration and an adjusted distribution allowing for the excess of women in the general population. It is evident from the adjusted distribution that the overall risk of blindness is

TABLE 12

Distribution of Blind Population between the Sexes

Age (years)	*Age distribution of blind population at registration*				*Adjusted distribution of female blind**	
	Male		*Female*			
	No.	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*
0–4	61	0·8	40	0·4	41	0·5
5–14	122	1·6	91	0·9	93	1·2
15–19	221	2·9	176	1·8	171	2·2
20–29	353	4·7	284	2·9	262	3·3
30–39	479	6·4	426	4·3	365	4·7
40–49	712	9·4	697	7·1	599	7·7
50–59	1,059	14·0	1,251	12·7	1,131	14·4
60–69	1,852	24·5	2,383	24·1	2,063	26·3
70 and over	2,524	33·4	4,369	44·2	2,966	37·9
Not stated	172	2·3	158	1·6	144	1·8
Total	*7,555*	*100·0*	*9,875*	*100·0*	*7,835*	*100·0*

* Method of adjustment: In each age group the female blind population was divided by the ratio Female/Male in the general population as shown in the 1931 Census for the sixteen regions studied; an estimate was thus produced of the number of female blind in a hypothetical population in which the two sexes are equally represented. The adjusted figures were then expressed as percentages of the total.

substantially the same for both sexes (though the causes involved may be different) but that women are either blinded by causes operating at a later age on the average or postpone their examination until a later age.

Degrees of Blindness

As can be seen from Table 13 the comparative distribution of the various degrees of blindness shows no substantial difference between the sexes.

TABLE 13

Degrees of Blindness according to Sex

Visual acuity	*Percentage distribution*	
	Male	*Female*
No perception of light ..	10·4	9·8
Perception of light	18·6	20·8
Hand movements	47·6	50·6
More than hand movements but less than 3/60 Snellen ..	6·5	5·9
3/60 Snellen	11·2	8·9
Better than 3/60 Snellen ..	5·0	3·4
Not stated	0·7	0·6
	100·0	*100·0*

Causes of Blindness

The proportionate distribution between the sexes of the more significant causes of blindness (Table A) is shown in Table 14, together with an adjusted

distribution allowing for the excess of females at risk in certain age groups. The percentages suggest that in men there are more congenital, hereditary and developmental defects, glaucoma, acquired syphilis, trauma, and optic atrophy, whereas women are more liable to myopia, cataract, congenital syphilis, diabetes, and iritis and iridocyclitis.

TABLE 14

Percentage Distribution of Major Causes of Blindness according to Sex

Cause	*Relative percentages of causes of blindness among:*		
	Males	*Females*	
		Actual	*Adjusted*
Congenital, hereditary and developmental defects ..	12·7	7·7	8·6
Myopia	9·5	11·8	12·3
Glaucoma	14·0	12·9	12·5
Cataract	19·8	28·4	26·3
Ophthalmia neonatorum ..	2·8	2·4	2·6
Syphilis:			
Congenital	3·4	4·9	5·4
Acquired	4·3	1·1	1·2
Industrial trauma	1·4	0·1	0·1
Non-industrial trauma ..	1·5	0·5	0·5
Diabetes	0·7	2·7	2·8
Senile macular degeneration ..	6·4	6·3	5·7
Optic atrophy	4·7	2·6	2·7
Iritis and iridodyclitis ..	4·1	5·2	5·3
All other causes	14·7	13·4	14·0
	100·0	*100·0*	*100·0*

Prognosis

The only cause of blindness of interest in this connexion is cataract. Table 15 shows that for this affection there is no significant difference between the sexes in the proportion of cases regarded as remediable, and it would appear that the

TABLE 15

Prognosis in Cataract according to Sex

	Total number of cataract cases	*Number remediable*	*Per cent*
Males	1,489	843	56·6
Females	2,804	1,643	58·6

same proportion of women as of men fail to seek operative relief. The greater incidence of blindness from cataract among women is, therefore, not due to any greater reluctance to seek treatment, but is probably due to a real excess of cataract in women.

OCCUPATIONAL DIFFERENCES

The occupations recorded on the blind certificates represent hearsay evidence, which was not always convincing, and the efficiency of the records varied from district to district. Moreover, the occcupation at the time of registration may have had no bearing on the development of blindness, for an individual with failing sight may have transferred to a quite different and more suitable occupation. In the present analysis, therefore, it was thought best to regard the occupation in which the applicant had been engaged for the longest period in his life as the one that might have affected his sight.

With the available data all that could be done was to assess the actual incidence of blindness in the different occupations (children under 14 years of age and occupations for the blind being excluded from consideration). These figures cannot be set against an expected incidence, because there is no reason to assume that all occupations should give the same proportionate number of blind as the population as a whole. Table 16 sets out the findings for those occupations with an apparently excess incidence.

TABLE 16

Occupations showing an Apparently High Incidence of Blindness

Occupation order	*Occupations with:*	
	apparent excess in men	*apparent excess in women*
III	Mining and quarrying	
II	Agricultural occupations	
XIII	Makers of textile goods and articles of dress	Makers of textile goods and articles of dress
VI	Workers in chemical processes—makers of paints, oils, etc.	
XII		Textile workers

Distinctly more reliable information on occupation is available in the case of industrial injuries, as under the diagnosis of trauma the examiner indicated in the blind certificate the trade that led to the injury. Table 17 shows the findings.

TABLE 17

Occupations showing an Apparently High Incidence of Blindness from Industrial Trauma

Occupational order	*Occupation*
III	Mining and quarrying
VII	Metal workers

REGIONAL DIFFERENCES

An adequate comparison between London and Middlesex, Wales, and English urban and rural areas would be feasible only if registration were fully effective and rates for the different types of population could be established. It is impossible on the material available, but, as Table 18 shows, there is little to suggest that there are any marked differences in the different parts of the country.

TABLE 18

Comparative Distribution in Four Regions of Causes of Blindness Responsible for more than 2·5 per cent of Cases

Cause	*London and Middlesex*	*Wales*	*Urban areas of England*	*Rural areas of England*
Cataract	21·2	23·5	29·7	29·3
Glaucoma	13·9	12·8	12·0	14·7
Myopia	12·2	11·4	8·8	8·8
Congenital, hereditary and developmental defects	10·2	12·3	8·6	9·7
Syphilis:				
Congenital	5·4	2·6	3·0	3·1
Acquired	3·0	1·6	2·1	0·9
Senile macular degeneration ..	5·4	6·5	7·6	8·0
Iritis and iridocyclitis	4·7	6·8	4·0	4·9
Optic atrophy	2·9	4·5	4·4	3·7
Ophthalmia neonatorum ..	2·8	1·9	2·5	1·7
All other causes	18·3	16·1	17·3	15·2
	100·0	*100·0*	*100·0*	*100·0*

Blindness from a Different Cause in the Two Eyes

There were two significant findings in the 1,719 cases of blindness from a different cause in the two eyes. In the first place, this group, representing 9 per cent of the total cases studied, was structurally different from the major group. Secondly, it made possible an assessment of the role of occupation in industrial accidents.

DEGREES OF BLINDNESS

No tangible difference existed between this group and the major group in the distribution of the various degrees of blindness. In both groups some 50 per cent had vision of hand movements only and some 30 per cent had either no perception of light or perception of light only.

AGE DISTRIBUTION

As can be seen from Table 19, 88·6 per cent of this group of patients were over the age of 50, as compared with 77 per cent of the major group. A higher concentration in the older age groups is also suggested by the fact that in this group only 4·6 per cent as against 10·1 per cent in the major group declared that their blindness (i.e. blindness in the second eye) came on in the early years of life (under 1, 1–4, and 5–14 years). It would seem, therefore, that among

TABLE 19

Age at Registration for Blindness of Persons Blinded by a Different Cause in the Two Eyes

Age (years)	Males		Females		Total	
	No.	Per cent	No.	Per cent	No.	Per cent
Under 1	—	—	1	0·1	1	0·1
1–4	—	—	—	—	—	—
5–14	3	0·3	4	0·6	7	0·4
15–19	6	0·6	3	0·4	9	0·5
20–29	14	1·4	6	0·8	20	1·2
30–39	23	2·3	12	1·7	35	2·0
40–49	72	7·3	25	3·4	97	5·6
50–59	151	15·3	92	12·7	243	14·1
60–69	304	30·6	177	24·3	481	28·0
70 and over	403	40·6	395	54·3	798	46·5
Not stated	16	1·6	12	1·7	28	1·6
Total	*992*	*100·0*	*727*	*100·0*	*1,719*	*100·0*

those blinded by a different cause in the two eyes the final cause of blindness is generally one of the affections normally seen in the higher age groups.

CAUSES OF BLINDNESS

As can be seen from Table B, p. 46 and Table 20, where each eye is listed separately, the causes of blindness are largely concentrated in a few categories.

TABLE 20

Causes of Blindness Responsible for more than 2·5 per cent of Cases: Each Eye listed Separately

Cause		Percentage
Trauma:		
Industrial	8·8	
Non-industrial	14·7	
Systemic poisoning	0·1	
War trauma	0·7	
Sympathetic ophthalmia	5·1	
Unspecified	1·5	
		30·9
Cataract		20·7
Glaucoma		8·8
Myopia		4·3
Senile macular degeneration ..		3·6
Corneal lesions		3·1
Iritis and iridocyclitis ..		2·9
All other causes		25·7
		100·0

As the percentages were computed on eyes, and not on individuals, it would at first appear that some 60 per cent of all individuals lost an eye from injury, but in fact the percentage is probably nearer 50, since many of those with sympathetic ophthalmia had lost their first eye from injury. The figures in Table 20 also suggest that a large proportion of individuals lost one eye from

cataract and the other eye from injury, probably at an earlier age (25·2 per cent in this group, as against 18·0 per cent in the major group, noticed the onset of trouble in the first eye between the ages of 15–49). The common combinations seen clinically were, in fact, trauma in one eye and cataract or glaucoma in the other, and cataract in one eye and glaucoma in the other.

PROGNOSIS

There were 10·4 per cent remediable cases in this group as against 10·2 in the major group, and 59·2 per cent not remediable as against 63·7 per cent in the major group.

SEX DISTRIBUTION

In contrast to the major group there were consistently fewer women in every age group from 15 to 70 years (Table 19), a difference obviously explicable by the markedly larger number of men blinded in one eye as a result of industrial or non-industrial trauma (Table 21). The excess of men blinded by sympathetic

TABLE 21

Incidence of Trauma as a Cause of Unilateral Blindness in Males and Females: Each Eye listed Separately

Trauma	*Numbers*		*Percentage of total eyes:*	
	Male	*Female*	*Male*	*Female*
Industrial	284	18	14·3	1·3
Non-industrial ..	321	211	16·2	14·5
Sympathetic ophthalmia	112	63	5·6	4·3
Unspecified	31	21	1·6	1·5
Total	*748*	*313*	*37·7*	*21·6*

ophthalmia is chiefly a reflection of the excess of men blinded in one eye by industrial and non-industrial trauma.

OCCUPATION IN INDUSTRIAL ACCIDENTS

The proportion of industrial injuries among persons blinded by a different cause in the two eyes was high and the data on occupation in these cases were reliable (Table 22). It is noteworthy, therefore, that the findings for industrial injuries are similar to those for the major group.

TABLE 22

Occupations showing an Apparently High Incidence of Blindness from Industrial Trauma and Sympathetic Ophthalmia

Cause	*Occupational order*	*Occupation*
Industrial trauma ..	III	Mining and quarrying
	VII	Metal workers ..
	II	Agriculture ..
Sympathetic ophthalmia	III	Mining and quarrying
	II	Agriculture ..

REGIONAL DIFFERENCES IN THE INCIDENCE OF TRAUMA

Table 23 sets out the proportionate frequency of the different forms of trauma in the four main regional areas. The total percentage of blindness from trauma is fairly similar for Wales and for the urban and rural areas of England,

TABLE 23

Regional Variations in the Proportionate Incidence of Trauma

Region	*Total No. of eyes*	*Industrial trauma per cent*	*Non-industrial trauma per cent*	*Sympathetic ophthalmia per cent*	*Trauma unspecified per cent*	*Total per cent of all eyes*
London and Middlesex	1,980	5·4	16·7	4·3	1·0	27·4
Wales ..	152	12·5	11·2	7·2	7·9	38·8
England—urban areas	1,016	12·7	14·2	5·6	1·8	34·3
England—rural areas	290	16·6	13·8	7·2	1·0	38·6

being respectively 38·8, 34·3 and 38·6 per cent of all eyes blinded by a different cause in the two eyes of the same patient; the percentage for London and Middlesex is rather lower, 27·4. The figures for Wales and for the rural areas of England are too small to allow any differential assessment of the varieties of trauma. The most marked difference between London and Middlesex on the one hand and the urban areas of England on the other is the considerably higher proportionate incidence of industrial accidents for the urban areas, 12·7 per cent against 5·4 per cent.

SYMPATHETIC OPHTHALMIA

There were 175 cases of sympathetic ophthalmia and they presented the following features of interest:

(*a*) The age distribution at examination did not differ materially from that of the group as a whole, 125 of the cases being concentrated in the age groups of 50 years and over.

TABLE 24

Occupations with Cases of Sympathetic Ophthalmia arising from Industrial Injury in Men

Occupational Order	*Occupation*	*No. of cases*
II	Agriculture	4
III	Mining and quarrying ..	5
VII	Metal workers	3
IX	Electrical apparatus makers	2
XXXI	Undefined occupations ..	5
	No occupation stated ..	4
	Other occupations ..	5
		28

(*b*) Non-industrial injury accounted for 49·7 per cent of all cases; cataract came next with 20·6 per cent, followed by industrial trauma with 18·3 per cent;

unspecified trauma was responsible for 6·8 per cent, and all other causes for 4·6 per cent. The 32 cases of sympathetic ophthalmia arising from industrial trauma contained 4 women and 28 men.

(*c*) The 28 men with sympathetic ophthalmia arising from industrial injuries were concentrated in a few categories (Table 24).

It may be concluded that persons with different causes of blindness in the two eyes differ from the major group in the following respects:

(*a*) They resemble the aged, rather than the general, population as regards liability to blindness. They are in fact largely a sample of the aged population rather than of that section of the general population especially prone to blindness from genetic or constitutional defects. They, therefore, largely escape the causes of bilateral blindness operative in the major group during the early and middle years of life.

(*b*) About half of them lost one eye through injury, probably during the active years of life.

(*c*) They contain an excess of men owing to the higher rate of industrial accidents in men.

IV. DISCUSSION

The Present Blind Population

RATE OF BLINDNESS

THE steep increase shown by the current number of registered blind over the figures recorded by the census of 1911 and by the registration of the blind in 1919—an increase of the order of three times—does not reflect an increase in the incidence of blindness. Two changes appear to have contributed to this apparent greater frequency of blindness.

In the first place, it is only during the course of the years since 1919 that registration has become reasonably fully effective (see p. 3). Secondly, the definition of blindness has become less rigid than in days gone by. At the beginning of the century there seems to have been general acceptance of Trousseau's definition, which implied vision of 1/60 Snellen or less. The census figures were based upon an even more stringent definition, for information was sought on "total blindness", which to the lay mind probably meant no perception of light or perception of light only. In the definition suggested by the Ophthalmological Section of the Royal Society of Medicine in 1915, and accepted officially for the purpose of the Blind Persons Act, blindness meant that an individual was "so blind as to be unable to perform any work for which eyesight is essential", a definition which in practice has been interpreted as implying vision not more than 3/60 Snellen, though vision more than 3/60 may still qualify for registration if gross field defects are present (Ministry of Health Handbook on Welfare of the Blind, 1939).

If the sample in the present study is representative, the totally and subtotally blind (No perception of light and perception of light only) on the present Register of 77,390 blind persons constitute some 30 per cent of all those registered, so that the numbers are very similar to the 26,336 recorded in the 1911 census and the 25,840 on the Register in 1919 (this last figure largely representing the totally and subtotally blind who came under the notice of the voluntary agencies serving Blind Welfare). Contrary to the general belief the census figures are, therefore, not grossly inaccurate for the degree of blindness ("total blindness") they sought to establish. In any case it is clear that the increase in the numbers of registered blind is largely consequent on a change in definition.

Any striking increase in the incidence of blindness can certainly be dismissed from consideration. On the other hand it is impossible to establish definitely that there has been any reduction in incidence. The relatively stationary number of new registrations since 1937 and the fact that even now not all blind persons do become registered make any fine assessment impossible. Table 25, constructed on data supplied by the Ministry of Health, suggests that since 1923 at any rate there has been a decline in the number of young people registered as blind, while the number in the middle years has remained relatively stationary since 1929 and the number of blind people over the age of 70 has increased steadily all the time. These data have to be assessed in the light of the changing age distribution of the population as a whole. On only one group, schoolchildren aged 5–15 years, is information sufficiently complete to warrant a detailed analysis. This group is dealt with separately below (p. 22).

For the blind population as a whole an approximate rate of blindness per 100,000 can be established on the basis of the total number of registered blind

for an estimated total population of England and Wales. As the population in 1947 was 43,270,000 and the number of registered blind 76,004, the rate of blindness is 175·6 per 100,000. Since registration of the blind is voluntary and probably still not fully effective, this rate is an underestimate, possibly by as much as some 15 or 20 per cent. A rate of about 200 per 100,000 would, therefore, appear to be the rate of blindness for England and Wales on the current definition of blindness. Were the definition of blindness to be made more stringent so as to cover only total and subtotal blindness (No perception of light,

TABLE 25

Registered Blind Population in England and Wales 1923–48

	Age in years							
Year	0–5	5–16	16–21	21–50	50–70	*Over 70*	*Unknown*	*Total*
1923	231	2,723	1,567	10,955	12,397	8,026	619	*36,518*
1925	257	2,720	1,682	12,200	15,048	9,865	368	*42,140*
1927	258	2,554	1,670	12,967	17,232	11,958	183	*46,822*
1929	258	2,438	1,623	13,901	20,149	14,304	54	*52,727*
1931	225	2,355	1,667	14,740	23,409	17,568	634	*60,598*
1933	244	2,089	1,613	14,955	25,066	19,277	164	*63,408*
1936	206	1,855	1,391	15,129	26,455	22,369	129	*67,534*

Year	0–1	1–5	5–16	16–21	21–40	40–50	50–65	65–70	*Over 70*	*Unknown*	*Total*
1938	11	184	1,676	1,350	7,939	7,278	18,904	9,247	25,141	147	*71,875*
1939	21	169	1,619	1,311	8,137	7,476	19,260	9,601	26,730	168	*74,494*
1940	9	186	1,499	1,327	7,964	7,589	19,020	9,860	26,811	153	*74,418*
1941	11	190	1,425	1,227	7,920	7,491	18,954	9,716	27,250	140	*74,324*
1942	9	192	1,369	1,124	7,728	7,393	18,493	9,784	29,053	161	*75,306*
1943	13	204	1,355	1,078	7,602	7,203	18,354	9,629	30,884	185	*76,507*
1944	8	201	1,376	1,018	7,494	7,056	17,946	9,596	31,291	159	*76,145*
1945	9	185	1,369	1,010	7,486	6,830	17,664	9,237	31,787	181	*75,758*
1946	13	201	1,375	1,048	7,372	6,834	17,367	8,977	32,606	104	*75,897*
1947	12	176	1,338	1,062	7,395	6,705	17,480	8,860	32,852	124	*76,004*
1948	16	220	1,328	1,015	7,475	6,743	17,573	8,839	34,084	97	*77,390*

and perception of light only) the rate would be reduced to the order of about 60 per 100,000. If on the other hand it were made less stringent, the limit being fixed at vision of 6/60 instead of the current and equally arbitrary 3/60, it is likely that the rate of blindness would rise to about 250 per 100,000, a figure in line with experience in Canada and the United States.

AGE DISTRIBUTION

As is shown in Table 26, the distribution for the 77,390 registered blind in 1948 does not differ materially from that revealed in the sample of certificates.

DECLINE IN THE FREQUENCY OF BLINDNESS IN SCHOOLCHILDREN

Few blind children between the ages of 5 and 15 fail to be registered, so that a calculated rate per 100,000 may be accepted as giving a true picture of the incidence of blindness in this age group. Table 27 shows the figures for the years 1923–48. During these years there was no change in the definition of blindness in schoolchildren to account for the great decline in the number of registered blind in the age group 5–15 years, and it may therefore be concluded

TABLE 26

Age Distribution of the Blind Population

Certificates analysed *Number*: 19,149		*Total blind population*, 1948 *Number*: 77,390	
Age (years)	*Per cent*	*Age (years)*	*Per cent*
Under 1	0·0	Under 1	0·0
1–4	0·5	1–4	0·3
5–14	1·2	5–15	1·7
15–19	2·1	16–20	1·3
20–29	3·4	21–39	9·7
30–39	4·9		
40–49	7·9	40–49	8·7
50–59	13·3	50–64	22·7
60–69	24·6	65–69	11·4
70 and over	40·2	70 and over	44·1
Not stated	1·9	Unknown	0·1
	100·0		*100·0*

that the incidence of blindness in children aged 5–15 years has declined to almost half in the twenty-five years between 1923 and 1948.

TABLE 27

Incidence of Blindness in Children aged 5–15 *years*: *England and Wales*, 1923–48

Year	*Estimated population aged* 5–15 *years*	*No. of registered blind aged* 5–15 *years*	*Rate per 100,000*
1923	7,344,600	2,723	37·0
1925	7,372,300	2,720	36·9
1927	7,420,700	2,554	34·4
1929	7,318,400	2,438	33.3
1931	7,167,300	2,355	32·8
1933	7,114,000	2,089	29·3
1936	6,995,700	1,853	26·4
1938	6,642,000	1,676	25·2
1939	6,519,000	1,619	24·8
1940	6,425,000	1,499	24·0
1941	6,321,000	1,425	22·6
1942	6,269,000	1,369	21·8
1943	6,250,000	1,355	21·6
1944	6,241,000	1,376	22·0
1945	6,213,000	1,369	22·0
1946	6,176,000	1,375	22·3
1947	6,185,000	1,338	21·6
1948	6,218,000	1,328	21·3

Such data as are available for the higher age groups do not support any suggestion that this trend is applicable to them too.

SEX DISTRIBUTION

As in the sample analysed, there were more women than men on the Blind Register in 1948, 41,279 women against 36,111 men (Table 28). But, as in the sample analysed, this excess of women, both in numbers and percentage distribution, is confined to the age groups of 65 years and over and is probably no more than a reflection of the excess number of women in these age groups of the population (see p. 12).

TABLE 28

Sex Distribution in the Total Number of Registered Blind Persons in 1948

Age (years)	*Registered blind persons in* 1948			
	Males		*Females*	
	No.	*Per cent*	*No.*	*Per cent*
Under 1	7	0·0	9	0·0
1–4	116	0·3	104	0·2
5–15	789	2·2	539	1·3
16–20	608	1·7	407	1·0
21–39	4,349	12·0	3,126	7·6
40–49	3,727	10·3	3,016	7·3
50–64	9,124	25·3	8,449	20·5
65–69	3,948	11·0	4,891	11·9
70 and over	13,405	37·1	20,679	50·1
Unknown	38	0·1	59	0·1
	36,111	*100·0*	*41,279*	*100·0*

ASSOCIATED MENTAL AND PHYSICAL DEFECT

The annual returns of the Ministry of Health include data on the physically and mentally defective among the blind. These data are presumably extracted from the blind certificates and for reasons indicated earlier (p. 6) must be regarded as incomplete. Nevertheless, the significant fact emerges that in 1948 out of a total of 77,390 registered blind persons 10,487 are shown as suffering from some form of mental or additional physical defect. The data on school-children are more reliable, and of the 1,328 children aged 5–15 years 989 were mentally and physically normal; of these 865 were at blind schools. Mental defect was present in 289 children, of whom 252 did not attend school. Additional physical defect was present in 50 children, of whom 36 were not at school. The high incidence of mental defect in blind children is noteworthy. It is equally noteworthy that of the 75,826 blind persons over the age of 15 no less than 65,123 were classified as unemployable.

The Changing Background

In any assessment of the causes of blindness on the basis of the certificates analysed three considerations have to be borne in mind. In the first place, the certificates analysed cover a number of years with a central period somewhere around 10 to 12 years ago. Secondly, there is a considerable time-lag between the onset of blindness and registration, apparently varying with different causes and possibly also with localities and the rapidity with which blindness sets in. Thirdly, there has in fact been a change in the relative frequency of the causes of blindness in recent years, as is conclusively shown by the decline in the rates of blindness for schoolchildren aged 5–15 years during the past 25 years. There is nothing to suggest that new causes of blindness have been operative in recent years, but there is much to indicate that some of the causes operative in years gone by are less productive of blindness than they were.

The following considerations are illustrative of the changes that have taken place.

OPHTHALMIA NEONATORUM

A steady decline in the frequency of blindness from ophthalmia neonatorum in the school population is suggested by Tables 29 and 30, which summarize data fully discussed elsewhere (Sorsby, 1945).

TABLE 29

Frequency of Ophthalmia Neonatorum in Four Surveys on Blind Children

Period	*Source*	*School population*	*Total number of blind children*	*Percentage of ophthalmia neonatorum*
1905–21	Harman	London County Council	1,855	19·8
1922–27	Annual Reports	London County Council	369	11·3
1922	Board of Education	Provincial Blind Schools	927	30·4
1944	Sorsby	Provincial Blind Schools	524	9·2

The decline in admissions for ophthalmia neonatorum to Sunshine Homes for Blind Babies over the years from 1920 to 1947 is even more conclusive (Table 30).

TABLE 30

Frequency of Ophthalmia Neonatorum at Sunshine Homes for Blind Babies, 1920–47

Years	*Total admissions*	*No. of ophthalmia neonatorum cases*	*Per cent*
1920–26	160	52	32·5
1927–33	181	45	24·8
1934–40	174	27	15·5
1941–47	243	10	4·1

This decline at Blind Schools and Sunshine Homes is corroborated by official statistics (Table 31) on the end results of ophthalmia neonatorum. For the seven years 1934–40 the number blinded was 44. For the seven years 1941–47 it was 5.

TABLE 31

Official Returns on Infants Blinded by Ophthalmia Neonatorum in England and Wales

Year	*Number blinded by ophthalmia neonatorum*	*Year*	*Number blinded by ophthalmia neonatorum*
1934	6	1941	1
1935	7	1942	0
1936	8	1943	2
1937	7	1944	0
1938	10	1945	2
1939	2	1946	0
1940	4	1947	0
Total 1934–40	*44*	*Total* 1941–47	*5*

PHLYCTENULAR OPHTHALMIA

In Harman's (1922) records of the blind child population in the area of the London County Council from 1905–21, phlyctenular ophthalmia was responsible for 66 of the total of cases, or 3·5 per cent. A similar percentage was observed for the country as a whole in the Board of Education inquiry of 1922, which recorded 34 cases, or 3·3 per cent. In the investigation at Provincial Blind Schools in 1944 there was one case in a total of 524.

INTERSTITIAL KERATITIS

In Harman's series interstitial keratitis accounted for 413 cases (22·3 per cent of the total); in the Board of Education investigation, for 81 cases, (7·8 per cent); in the inquiry at Provincial Blind Schools in 1944, for 26 cases (5·0 per cent).

OTHER INFECTIOUS DISEASE IN CHILDHOOD

Evidence for the decline of blindness from other infectious disease in childhood is less extensive, but it would appear that there has been a steady diminution in the frequency of blindness from all these causes.

CONGENITAL, HEREDITARY AND DEVELOPMENTAL DEFECTS

In consequence of the decline in the significance of infectious disease as a cause of blindness, the congenital and hereditary anomalies have assumed a relatively greater significance. The proportionate frequency of these affections has risen from 37·3 per cent in the series recorded by the Board of Education in 1922 to 67·6 per cent in the Provincial Blind Schools studied in 1944 (Sorsby, 1945).

Though there are no similar data available on changes in causes of blindness in the adult population, it seems certain that considerable modifications in the relative significance of the different causes must have occurred and that syphilis, tuberculosis, and trachoma, for example, must be less significant today as causes of blindness in adults than they were in the relatively recent past.

The Causes of Blindness To-day

The following schematic representation is put forward as a broad indication of the problems of today:

MAJOR CAUSES

(Responsible for 10 per cent or more cases in the analysed material) Cataract; glaucoma; myopia; congenital, hereditary and developmental defects; infectious diseases (24·6, 13·4, 10·8, 9·9, and 12·3 per cent respectively).

These five major causes were responsible for 71 per cent of all analysed cases of blindness. On the assumption that some such proportion applies to the present blind population there are today some 55,000 people blinded by these five causes. It is, however, unlikely that they will continue to produce so much blindness.

One group, the infectious diseases, responsible for 12·3 per cent of all cases, is clearly declining, so that in the future we need not expect some 10,000 individuals blinded by infectious disease. The mass horror of some 2,000 individuals blinded by ophthalmia neonatorum should never recur. It is unlikely that

trachoma today is in fact responsible for its computed 700 cases of blindness. It is more difficult to assess the present significance of syphilis as a cause of blindness, though it is fairly certain that it has not the weight which it was given in the past. The importance of tuberculosis and phlyctenular ophthalmia as causes of blindness—assessed in this analysis at 0·7 per cent—is also difficult to estimate. The significant facts are, however, that not only have the infectious causes of blindness dwindled, but that adequate measures for the treatment of infections are now readily available. Infectious diseases should not loom large in the future as a cause of blindness in this country.

There is, however, no reason to assume that the remaining four major causes have declined, or are declining, to any extent. On the basis of this analysis there are some 20,000 people blind from cataract, of whom at least a third are remediable by the available surgical procedures. The remaining three causes present two distinct problems. The high incidence of blindness from glaucoma, responsible on this computation for more than 10,000 blind individuals, is not likely to have declined and is a sad comment on the efficacy of present diagnostic and therapeutic methods. As for myopia and the congenital, hereditary and developmental defects, which together account for some 15,000 blind people, all that can be said is that even unsatisfactory methods of treatment are not available.

It may be concluded that:

(1) Some 25,000 people are blinded by glaucoma, myopia and the congenital anomalies. There is no reason to assume any reduction in this incidence in the immediate future.

(2) Some 20,000 people are today blind from cataract, a number that could be reduced by at least a third if existing methods of treatment were utilized to the full.

(3) In the fairly recent past the infectious diseases produced some 10,000 of the total blind population. In the near future such a figure may seem as much past history as blindness from smallpox had become by the end of the last century.

INTERMEDIATE CAUSES

(Responsible for 1·0–10 per cent of cases in the analysed material) The inflammatory affections; senile macular degeneration; optic atrophy; corneal lesions; vascular diseases; diabetes; trauma.

None of these seven affections is highly significant by itself, but in total they are not inconsiderable, causing 25·8 per cent of cases in the analysis and therefore giving a computed number of some 19,000 blind persons.

There are no reasons for believing that this number will decline in the immediate future. The senile macular degenerations and the vascular diseases, which together accounted for 8·3 per cent in the analysis, are not less frequent today than they were in the past; nor is blindness from diabetes or from the nondescript corneal lesions, together responsible for 4·1 per cent in the analysis. Whether optic atrophy, responsible for 3·5 per cent, with its composite and ill-defined aetiology, is any less frequent today may be doubted. It may also be doubted whether there is any reduction in the inflammatory affections, represented in this study by iritis and iridocyclitis, with their 4·7 per cent, and an unknown quota of choroidal lesions and corneal lesions. Trauma, assessed in this study at 1·6 per cent, is also unlikely to have declined.

LESSER CAUSES

In this analysis the mass of lesser causes gave 3·2 per cent of all cases. On this basis there are some 2,000 people blinded by these affections. There is nothing to suggest that this number will decline in the immediate future.

CONCLUSIONS

With full allowance for a continuing decline in the frequency of blindness from infectious diseases and for the possible elimination of a substantial proportion of blindness from cataract, an optimistic assessment would still leave well over 50,000 irremediably blind in the country. Since "senile" causes of blindness are so prominent in any analysis of the blind population, the present shift towards an older population emphasizes that this estimate may well be too low.

The gloomy prospects for the future are perhaps best illustrated by the trend of blind statistics in the school population. In this group, in which the cumulative action of the measures evolved in the past has led to the rate of blindness being almost halved in the space of the past quarter of a century, further reduction is rapidly coming to an end. The present rate of 21·3 per 100,000 applies to a group in which 67·6 per cent are blinded by the congenital and hereditary anomalies (including myopia), as against only 37·3 per cent of all blindness seen at Blind Schools in 1922. If it is assumed that the residual 32·4 per cent not due to congenital and hereditary anomalies can be eliminated, the rate will decline to as low as 15 per 100,000 in the foreseeable future. Beyond that there does not seem to be any likelihood of further decline.

Problems and Prospects

THE DEFINITION OF BLINDNESS

In the case of children an Act of Parliament of 1893 ("An act to make better provision for the elementary education of blind and deaf children in England and Wales") defined blindness as meaning "too blind to be able to read the ordinary school books used by children". A superficially similar empirical definition for adults was suggested in the Bill before Parliament in 1915 providing for the technical education, employment, and maintenance of the blind, the definition being: "too blind . . . to perform any work for which eyesight is ordinarily required". At the suggestion of the Section of Ophthalmology of the Royal Society of Medicine this definition was amended to read "is essential" instead of "ordinarily required". The same body also considered the advisability of supplementing this general definition by numerical standards expressing degrees of blindness. It held that "Experience shows that persons whose acuity of vision (refractive error being corrected) is below *one twentieth* of the normal (3/60 Snellen) are usually unable to perform work requiring eyesight, while persons with vision better than *one tenth* (6/60 Snellen) are usually able to perform some such work. Persons with intermediate degrees may or may not be able; much depends on intelligence and bodily strength, and much on the nature of the blindness". It added that "The numerical limitations mentioned above are likely to be useful as preliminary guides, but until experience has been gained through the working of the Act they should be regarded as purely tentative". It also considered the difficulties arising from field defects.

The Blind Persons Act of 1920 carried forward both these definitions. In children blindness meant inability to read ordinary school books; in adults it meant inability to do any work for which eyesight is essential. In practice this double definition has involved the not inconsiderable difficulty that some children brought up in blind schools ceased to be regarded as blind when they left school, for their sight was not so poor as to debar them from performing "any work for which eyesight is essential". It is unnecessary to stress the disadvantage of a young adult with defective vision, brought up in a blind school, having to compete with the normally sighted for sighted employment for which he has not been trained.

Though the Section of Ophthalmology of the Royal Society of Medicine advocated the numerical standard of 3/60 merely as a tentative guide to certification of adults, that standard has in practice been the deciding criterion in certification for many years now, except in the relatively few cases in which certification is granted because of field defects. The standard of 3/60 is obviously lower than the standard used for blind schools, as is shown by the fact that decertification of children leaving blind schools has in the past been not infrequent and has presented many certifying surgeons with a difficult problem. It does not appear that the standard of 3/60 is based on any substantial investigation under field conditions in industry. In 1915 that standard was a considerable advance on the Trousseau standard of 1/60, but it has not won universal acceptance. In the United States the standard employed is generally 20/200, or approximately 6/60, and in Canada it is 6/60.

Any attempt to establish a numerical standard is beset by pitfalls; it is possible to make almost equally plausible cases for either 1/60, 3/60, or 6/60. But the difficulty with the definition of blindness as that state in which a person is "so blind as to be unable to perform any work for which eyesight is essential" is that the definition requires defining. "Any work for which eyesight is essential" is a large term. Some work requires exceedingly fine binocular vision; some can be done with moderately good uniocular vision. Only a limited number of occupations can ever be open to those with grossly defective vision—and it is a moot point whether such occupations are not in fact occupations for the blind.

The fundamental difficulty would appear to be this: though the definition of blindness is superficially parallel for adults and children, in terms of human life the similarity is illusory. In the case of children the definition is essentially vocational; the only vocation open to children in a civilized community is learning, and the definition of blindness in children recognizes blindness as that state which prevents a child from following his proper vocation. The definition of blindness in adults is, on the other hand, a general statement, which ignores the vocational possibilities of the applicant. A shorthand typist, a needlewoman, a watchmaker, a tailor, or for that matter an ophthalmic surgeon, whose visual acuity has become considerably reduced, is in the same position as a child unable to read ordinary school books; both groups are vocationally blind. It is true that a middle-aged man or woman, trained to a specialized occupation requiring fine vision, is free to take up another occupation for which fine vision is not essential—true but not often practicable, particularly for the ageing individual.

The difficulties that have arisen owing to these dual and rather incompatible definitions of blindness centre largely on this issue of vocational competence. The obligation on the certifying examiners to assess an individual's capacity to

"perform any work for which eyesight is essential" also implies that the examining ophthalmologist is familiar with the requirements of vision in the various occupations for which a substantial degree of vision is not essential. We do not know whether the increasing mechanization of industry has increased or diminished the number of such occupations, nor whether the 3/60 standard, even if applicable in 1915, would still be suitable today.

Admittedly it is a difficult task to define blindness in numerical terms, and it may be that it is best not to make the attempt. Two alternative procedures seem feasible. A field survey of occupations in which fine eyesight is not essential, to determine whether indeed there are any occupations in which vision of 3/60 or 6/60 will enable an individual to hold his place. If such occupations do not in fact exist or if their absorptive capacity is too limited, the refusal to certify an individual with grossly defective vision, who can no longer hold his place in his own occupation, amounts to little more than penalizing him for not being more blind than he is. A field survey would, in any case, supply more adequate data for a numerical standard than are available today. Is the American standard of 20/200 (or approximately 6/60) too low or is the British standard of 3/60 too high?

The second, and probably better, alternative is to raise the level required for registration to such indisputable degrees of blindness as are represented by *no perception of light*, *perception of light only*, and *hand movements*, i.e. to a standard approaching the 1/60 standard of Trousseau. Such a definition would still cover some 80 per cent of those certified today. The remaining 20 per cent are only slightly worse off than an unknown but considerable number in the general population who are vocationally but not certifiably blind. Certification could then take into account two distinct categories:

(*a*) those blind by a stringent standard and certifiable on exclusively ophthalmological considerations.

(*b*) those blind vocationally and certifiable on combined ophthalmological and industrial considerations.

Argument on the exact definition of blindness is largely a scholastic exercise. Today, when physical disability is recognized as deserving special consideration, the concept of vocational blindness should seem no startling innovation. Nor is it simply a plea for charity. On the contrary it carries into ophthalmology the premises of rehabilitation with its undoubted benefits to the individual and society. The vocationally blind could with advantage be left to the care not of the authorities for blind welfare but of those concerned with the physically disabled.

An approach to this point of view would appear to be reflected in the recent official interpretation of the National Assistance Act of 1948. The Local Authorities are empowered to establish Observation Registers of partially sighted persons and to grant to such persons the Welfare Services to which the blind are entitled (Ministry of Health, 1948).

THE BURDEN OF VISUAL DEFECT

The second of the courses suggested in the previous section would have the additional advantage of compelling awareness of the problem of those who, while not falling within a narrow definition of blindness, have nevertheless grave difficulties consequent on defective vision. It is not an inconsiderable problem,

though the number of people with gross visual disability is unknown. The issues involved can be indicated only in general terms.

The appallingly large number of people blind from cataract represents only a fraction of the elderly individuals who suffer from steady deterioration of sight owing to lens opacities. Cataract is generally a slowly maturing process. In recent years improved surgical technique has enabled earlier operations than in days gone by, but visual deterioration from lens opacities still remains a considerable burden on the elderly, frequently determining the end of their ability to earn a living.

Glaucoma presents a similar problem. Glaucoma is a symptomless condition during the greater part of its relentless development and operation does not restore what is already lost, so that in addition to those blinded by the disease there are large numbers whose sight has deteriorated grossly before operation arrested its further progress.

Myopia leads to gross visual disturbances more often than to certifiable blindness, a fact which supports the belief that in the major blinding affections of today the number of patients with grossly damaged sight is probably many times that of the certifiably blind.

How far a similar conclusion applies to the congenital, hereditary and developmental defects is more difficult to assess. In the abiotrophic group it is fairly certain that the number with gross visual defects exceeds the number certifiably blind. In the congenital and developmental defects slowly maturing processes hardly come into the question, and here the number actually registrable is probably not far off the total affected.

It is unnecessary to labour this point by examining all the intermediate and lesser causes but it is worth stressing that one group at any rate, the inflammatory affections and especially the cases of iritis and iridocyclitis, constitutes a potent source of visual disablity short of blindness. Likewise, though trauma figures as a minor cause of blindness, blind statistics do not reveal the significance of injury as a cause of loss of vision in one eye.

The significance of the blinding affections cannot, therefore, be measured by blind statistics alone. Such statistics are a measure of the final catastrophe, but they are also an index of a much more widespread, even if less disastrous, ocular ill health.

THE PAST AND ITS LESSONS

The most authentic data on the elimination of a blinding disease are available in the case of ophthalmia neonatorum, which 60 or 70 years ago was probably the commonest cause of blindness in this country. In this achievement three distinct tendencies played their part. In the first place, there came the recognition of ophthalmia neonatorum as due to infection of the mother and the realization that it might be possible to prevent the infection from entering the baby's eyes; the Credé procedure evolved in consequence and led to some reduction in the incidence of the disease. The second factor was the provision of facilities for treatment under the General Order of 1914, which made ophthalmia neonatorum a notifiable disease. The decline of the incidence of blindness from ophthalmia neonatorum substantially dates from this development, for treatment was no longer left to haphazard circumstances but was provided by the State. The third and culminating phase dates back to the last 15 years, when the development of the sulphonamides and penicillin made available a potent means

of treatment. The recognition of the nature of the affection led to rational preventive measures; legislative action provided facilities for treatment; and academic research led to adequate means of treatment. These three in combination have made blindness from ophthalmia neonatorum an uncommon and entirely avoidable personal tragedy instead of the mass horror of the past.

A century of effort in public health legislation, hospital administration, bacteriology and pharmacology is reflected in the great diminution of the incidence of blindness during the past 100 years. As a result the infective causes of blindness have been largely eliminated or brought under control. The further operation of the same measures is likely to reduce blindness still more but at an ever diminishing rate.

The contribution of the nineteenth century consisted largely of the elimination of epidemics by improving sanitation and providing hospitals. During the nineteenth century 52 eye hospitals were developed in the provinces and 18 in London. Of these 70 institutions only 23 were surviving in 1948, but all made substantial contributions towards the reduction of blindness.

The earlier years of this century saw a considerable expansion of hospital facilities and brought a purposive and positive attitude on the part of the State to the problems of health. There is room for further expansion of the facilities evolved and developed in the past, but the problems of today call also for new measures and new aspirations. The elimination of blindness now demands not only more intensive administrative effort and more highly developed hospital facilities—the two advances bequeathed to us by the nineteenth century—but also the creation of new knowledge. An understanding of the congenital and hereditary anomalies, of myopia, the inflammatory diseases, glaucoma, cataract, and the "senile" degenerative processes is the necessary prerequisite before purposive action can be taken. That understanding we do not yet possess.

ACKNOWLEDGEMENTS

FOR access to the Certificates of Blindness held by their authorities, I am indebted to Sir Allen Daley, Medical Officer of Health of the London County Council; Dr. H. M. C. Macauley, lately Medical Officer of Health of the Middlesex County Council; Miss V. Spenser Wilkinson, Secretary of the Southern Regional Association for the Blind; Dr. C. G. Kay Sharp, the Chairman of the Medical Committee, and Mr. J. Challinor, the Secretary of the Northern Counties Association for the Blind; and to Mrs. Ethel Rawden, Secretary of the Wales and Monmouthshire Regional Council for the Blind.

Sir Allen Daley readily placed the statistical facilities of his Council at my disposal. I am greatly indebted to Mr. B Benjamin, Statistician to the Public Health Department of the London County Council, for his constant help and guidance, and I am also obliged to Mr. C. A. Gould, Mr. D. Hicks, Miss B. E. Rix, and other members of the Council's statistical department. Miss W. Bramhall of the Ministry of Health, Dr. Verner Wiley of the London County Council and Mr. W. McG. Eagar, lately Secretary General of the National Institute for the Blind, helped with published and unpublished official data.

In transcribing and sorting out the information on Blind Certificates, I have had the invaluable help of Miss Ann Lakeman and my Secretary, Miss E. M. Gower, to whom I am also indebted for her careful handling of a trying manuscript. No formal acknowledgement is adequate for the help at all stages I have had from my wife.

REFERENCES

Blane, G. (1819), *Trans. Med. and Chir. Soc.*, *10*, 315.

Board of Education (1922), In Ministry of Health, Departmental Committee on the Causes and Prevention of Blindness, *Final Report*. H.M. Stationery Office, London.

Dickson, R. M. (1946), *Brit. J. Ophthal.*, *30*, 382.

Harman, N. B. (1922), In Ministry of Health, Departmental Committee on the Causes and Prevention of Blindness, *Final Report*. H.M. Stationery Office, London.

Liverpool School for the Indigent Blind. *Annual Report* for 1872. Quoted in General Report of Census of England and Wales for the year 1871, *4*, 58. (Cd. 872–1). H.M. Stationery Office, London, 1873.

Marshall, J., and Seiler, H. E. (1942), *Brit. J. Ophthal.*, *26*, 337, 385, 433.

Ministry of Health (1939), *Handbook on Welfare of the Blind*, 3rd ed. H.M. Stationery Office, London.

——————— *Register of the Blind*: Various Annual Returns.

——————— (1948), *Circular*, 150/48. H.M. Stationery Office, London.

——————— personal communications.

Northern Counties Association for the Blind (1938), 32*nd Annual Report*, p. 56.

Ophthalmological Society of the United Kingdom (1884), *Trans.*, *4*, 33

Prevention of Blindness Committee (1938) (of the Union of Counties Associations for the Blind). *Report of an Analysis of a Preliminary Classification of the Causes of Blindness*.

Registrar General. Census Returns, 1851–1931.

——————— personal communications.

Report of the Royal Commission on the Blind, the Deaf, and Dumb, etc., of the United Kingdom (1889). 1, xiv, (Cd. 5781). H.M. Stationery Office, London.

Royal Society of Medicine (1915), *Proceedings*, *7*, pt. iii. Section of Ophthalmology, p. 149.

Snell, S. (1907), *Brit. Med. J.*, *2*, 1215.

Sorsby, A. (1945), *Ophthalmia Neonatorum*. Hamish Hamilton, London.

APPENDIX I

(FRONT PAGE OF FORM B.D. 8.)

STRICTLY PRIVATE AND CONFIDENTIAL **Form B.D. 8.**

County (Borough) of.....

Examination for Admission to Register of Blind Persons

Name of Person Examined..... *Sex*.....

Occupation (Specify, with dates)..... *Date of Birth*.....

Previous Occupations (Specify, with dates).....

Address .....

This section should be completed before forwarding to the Ophthalmic Surgeon.

EXAMINATION OF EYES

NOTE. The answers to questions in Sections 2 and 3 are required in order that reliable information may be obtained as to the causes of blindness with a view to assisting in devising appropriate measures for its prevention. It is therefore of importance that great care should be taken in making these replies as accurate as possible, and that entries should be made for each eye.

It is intended that Section 2 should be confined to a record of what the ophthalmologist actually finds in examining the eyes, and Section 3 should state as far as possible the causes to which these conditions are attributable, *e.g.* if the examination shows interstitial keratitis caused by syphilis "interstitial keratitis" should be entered under "Cornea" in Section 2 (*e*), and "syphilis" under Section 3 B (3).

The findings in Sections 2 and 3 should be entered in Section 6.

	Right Eye	Left Eye
1. HISTORY OF CASE		
(*a*) Age at onset of eye trouble which led to blindness ..	.....	.....
(*b*) Age at onset of blindness	.....	.....
2. PHYSICAL EXAMINATION OF THE EYES		
(*a*) Visual Acuity—(i.) Unaided	.....	.....
(ii.) With focus properly corrected ..	.....	.....
(iii.) Both eyes together unaided.....		
(iv.) Both eyes together with focus properly corrected.....		

(*b*) Generally age at which applicant was unable to follow usual occupation on account of eye trouble.

	* Right Eye	* Left Eye
(*b*) Field of vision .. .. * (*Please underline appropriate condition.*)	(i.) Good (ii.) Contracted (iii.) Less than 10° (iv.) Central Scrotoma (v.) Hemianopia (vi.) Nil	(i.) Good (ii.) Contracted (iii.) Less than 10° (iv.) Central Scrotoma (v.) Hemianopia (vi.) Nil
(*c*) Globe (tension, muscles, *e.g.*, squint, nystagmus, &c.) ..	.....	.....
(*d*) Lids	.....	.....
(*e*) Cornea	.....	.....
(*f*) Iris	.....	.....
(*g*) Ciliary body	.....	.....
(*h*) Lens	.....	.....
(*j*) Vitreous	.....	.....
(*k*) Retina	.....	.....
(*l*) Choroid	.....	.....
(*m*) Optic nerve	.....	.....

(*n*) Prognosis .....

(*o*) Is re-examination for any reason desirable? If so, when?.....

[P.T.O.

(LEFT INSIDE PAGE OF FORM B.D. 8.)

The appropriate cause or causes of the condition found in Section 2 should be underlined in this Section 3, indicating for each eye the main cause with the figure (1), and other cause, if any, with the figure (2)

Ophthalmic surgeons should complete as much of Sections C. and D. as may be possible with the information at their disposal, as particularly as they are able.

3. CAUSES OF EYE DEFECTS (as ascertained in 2, see marginal note).	Right Eye	Left Eye
A. Congenital and Undetermined Causes—		
(1) Congenital, hereditary and developmental defects		
(2) Myopic error		
(3) Other errors of refraction. (Specify)		
(4) Glaucoma, primary		
(5) Cataract, primary		
(6) Other primary ocular defects, *e.g.*, primary detachment of retina. (Specify)		
(7) Tumour—intra-ocular		
(8) Tumour—adnexa		
(9) Other, *e.g.*, amblyopia ex anopsia, &c. (Specify)		
B. Infectious and Bacterial—		
(1) Ophthalmia Neonatorum		
(2) Gonorrhœa		
(3) Syphilis		
(*a*) Congenital		
(*b*) Acquired		
(4) Trachoma		
(5) Local infection of coats of eye		
(6) Specific Fevers, *e.g.*, smallpox, measles, scarlet, diphtheria (Specify)		
(7) Meningitis—cerebro-spinal and other non-tuberculous forms· (Specify)		
(8) Tuberculosis		
(9) Eczematous kerato-conjunctivitis, *e.g.*, phlyctenular, &c., not definitely tuberculous		
(10) Septicæmia, acute		
(11) Septicæmia, chronic; auto-toxic, focal sepsis		
(12) Other infections and bacterial diseases. (Specify)		
C. Traumatic and Chemical—		
(1) Industrial—		
(*a*) Trauma		
Cause		
Trade		
Process		
(*b*) Industrial disease		
Cause		
Trade		
Process		
(2) Non-industrial—		
(*a*) Trauma		
(*b*) Systemic poisoning, *e.g.*, tobacco, alcohol, lead, arsenic, thallium, &c. (State precise cause)		
(*c*) Birth trauma		
(*d*) War trauma		
(3) Indirect: sympathetic ophthalmia		
(4) Trauma (category not ascertainable)		
D. General Diseases—		
(1) Anæmia and other blood diseases. (Specify)		
(2) Vascular diseases, including cerebral vascular lesions. (Specify)		
(3) Diseases of the central nervous system (except meningitis and those mentioned at (4) and (5) below). (Specify)		
(4) Diseases connected with disorders of pregnancy and childbirth *e.g.*, eclampsia. (Specify)		
(5) Intracranial neoplasm		
(6) Diabetes		
(7) Nephritis		
(8) Other general diseases. (Specify)		
E. No information obtainable.		

(RIGHT INSIDE PAGE OF FORM B.D. 8.)

4. REMARKS, *e.g.*, Family history, &c.

It is specially desirable that in cases where it is applicable (Leber's Disease, Tay-Sachs' Disease, Retinitis Pigmentosa, and Allied Diseases, High Myopia, etc.) as much information as possible regarding relatives who are blind or who have seriously defective vision should be detailed. In all cases of disease which may be of genetic origin it is particularly requested that a definite statement shall be made as to whether or no any relatives have been known to be similarly affected, and whether the parents of the individual were or were not consanguineous. This space should, if possible, not be left blank.

(*Please UNDERLINE the words which apply in this Section* 5.)

It is hoped that Ophthalmic Surgeons will complete as much of this Section as may be possible with the information at their disposal.

5. OTHER MENTAL, NERVOUS OR PHYSICAL DISABILITY (IF ANY) IN ADDITION TO BLINDNESS, e.g.

(1) Mental defect. (4) Deaf-mutism.
(2) Epilepsy. (5) Crippling defects, bones, joints, spinal, etc. (Specify) .....
(3) Deafness. (6) Other. (Specify).....

Enter in this section the appropriate letters and numbers from Sections 2 and 3, *e.g.*, in a case of Retinitis with Optic Atrophy the certifying Ophthalmic Surgeon might underline in Section 2 (*b*) Field of Vision ii. Contracted, also (*k*) Retina and (*m*) Optic Nerve, and complete Section 6 (A) thus:—
Eye defects found:
(1) *k* (1) *k*
(2) *m* (2) *m*
(3) *b* ii. (3) *b* ii.

6. DIAGNOSIS AND SUMMARY OF CASE

		Right Eye	Left Eye
A. Eye defects found (*see* Section 2)	Main	(1)	(1) .....
	Other	(2)	(2) .....
		(3)	(3) .....
B. Cause of eye defects (*see* Section 3)	Main	(1)	(1) .....
	Other	(2)	(2) .....

(*Please UNDERLINE the words which apply in this Section* 7)

The appropriate letters and numbers from Section 3 will be entered in Section 6 (B).

7. TREATMENT

A. History of Institutional Treatment and Operations for Ophthalmic condition or its cause—
(1) Not known. (4) Medical, unsuccessful (7) Surgical, unsuccessful.
(2) None. (5) Medical, uncompleted (8) ,, uncompleted
(3) Medical, successful (6) Surgical, successful.

B. History of Anti-Syphilitic Treatment—
(1) Not known. (4) Other treatment, if any (Specify) .....
(2) Regular course at hospital or clinic.
(3) By private practitioner. (5) No medical treatment.

C. Treatment recommended—
(1) None. (2) Medical. (3) Surgical. (4) Optical.
(5) Educational, *i.e.*, by special methods (if under 16).

D. Would Treatment probably remove person from blind category?
(1) Yes. (2) No. (3) Doubtful. (4) Yes, but inadvisable on general grounds

E. Is Wassernan or other serological test recommended?
(1) Yes. (2) No. (3) Result (when known).
(*If the applicant has already had a serological test carried out, UNDERLINE* (4 *or* (5) *whichever is appropriate.*)
(4) Positive. (5) Negative.

[P.T.O.

(BACK PAGE OF FORM B.D. 8.)

CERTIFICATE

(The answers to the following questions must be YES or NO)

(1) Do you consider the person "so blind as to be unable to perform any work for which eyesight is essential"? (This disability refers to *any* work and not to his or her own occupation and it must be distinct from any other disability of mind or body.) (*See* Note A.) .. ..

(2) **If the person is a child under 16—**

(*a*) Is he so blind that he can only be appropriately taught in a Special School for *blind* children? .. ..

If the answer to this question is "No"—

(*b*) Has he such bad vision that he cannot read ordinary school books without risk of injury to his eyesight, or that he cannot with advantage be taught in an ordinary Elementary School, and should therefore be taught in a Special School for **partially sighted** children? (*See* Note B.) .. ..

(3) **If the person is a child under 16,** do you consider it likely that the child, on attaining the age of 16, will be "so blind as to be unable to perform any work for which eyesight is essential"? .. ..

(4) **If the person is 16 years of age or over** and not at present "so blind as to be unable to perform any work for which eyesight is essential", do you consider it likely that the person will become so blind during the next four years? (*See* Note C.) .. ..

Address of place of Examination.....

.....

Signature.....

* *Registered Medical Practitioner*

Date.....19...

* The Registered Medical Practitioner may add particulars of special ophthalmic qualifications or experience (if any).

NOTES

A. The criteria which should be adopted in interpreting these words are explained in the Ministry of Health Circular 1353 of the 5th October, 1933.

B. It must be understood that children who, by means of suitable glasses, are able to read the ordinary school books used by children, without fatigue or injury to their vision, do not fall within the above categories. Children included in (2) (*b*) above must not be entered on the register of blind persons.

C. The primary object of this question is to determine whether a person not yet blind should be trained in anticipation of his becoming blind by the time the training is complete.

APPENDIX II.

Summary Report on 3,824 Blind Certificates for the Period April 1, to December 31, 1948

DURING the nine months, April to December, 1948, 2,309 certificates were submitted by the Southern Regional Association for the Blind and 1,515 certificates by the North Regional Association for the Blind. The following summary Tables show the essential findings.

A. Blindness from the Same Cause in Both Eyes

TABLE I

Visual Acuity at Registration for Blindness

Visual acuity	*Southern Regional Association for the Blind*				*North Regional Association for the Blind*			
	Male		*Female*		*Male*		*Female*	
	No.	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*	*No.*	*Per cent*
No perception of light	65	7·6	96	7·6	41	7·0	61	7·4
Perception of light ..	145	16·9	211	16·7	97	16·6	158	19·1
Hand movements ..	329	38·2	467	36·9	238	40·8	338	40·9
More than hand movements, but less than 3/60 Snellen	58	6·7	95	7·5	72	12·3	78	9·5
3/60 Snellen	43	5·0	74	5·8	33	5·7	45	5·4
Better than 3/60 Snellen	213	24·7	306	24·2	97	16·6	131	15·9
Not stated	8	0·9	17	1·3	6	1·0	15	1·8
Total ..	*861*	*100·0*	*1,266*	*100·0*	*584*	*100·0*	*826*	*100·0*

TABLE II

Average Age at Reputed Onset of Eye Trouble and of Blindness at Registration

	Southern Regional Association for the Blind		*North Regional Association for the Blind*	
	Male	*Female*	*Male*	*Female*
	Average age (years)		*Average age (years)*	
At reputed onset of eye trouble	49·5	53·2	51·6	52·7
At reputed onset of blindness	60·9	66·0	59·3	61·7
At registration ..	64·4	69·1	65·3	68·3

TABLE III

Percentage Distribution of Causes of Blindness Responsible for more than 1·0 per cent of Cases

Cause	Southern Regional Association for the Blind				North Regional Association for the Blind			
	Male		Female		Male		Female	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Cataract	175	20·3	364	28·8	194	33·2	293	35·6
Primary glaucoma	142	16·5	180	14·2	79	13·5	118	14·3
Senile macular degeneration	118	13·7	177	14·0	73	12·5	77	9·4
Congenital, hereditary, and developmental defects	97	11·3	84	6·5	59	10·1	56	6·7
Myopia	67	7·8	120	9·5	44	7·5	62	7·5
Other primary ocular defects	18	2·1	14	1·1	5	0·9	8	1·0
Syphilis:								
(a) congenital	11	1·3	13	1·0	4	0·7	11	1·3
(b) acquired	14	1·6	3	0·2	3	0·5	1	0·1
Vascular diseases	29	3·4	31	2·4	17	2·9	22	2·7
Diseases of the central nervous system	10	1·2	6	0·5	5	0·9	2	0·2
Intracranial neoplasm	11	1·3	14	1·1	7	1·2	4	0·5
Diabetes	24	2·8	53	4·2	10	1·7	33	4·0
Aetiology undetermined	112	13·0	164	13·0	61	10·4	118	14·3
All other causes	33	3·7	43	3·5	23	4·0	21	2·4
Total	*861*	*100·0*	*1,266*	*100·0*	*584*	*100·0*	*826*	*100·0*

TABLE IV

Treatment and Prognosis in Cases of Cataract

	Southern Regional Association for the Blind		North Regional Association for the Blind		Both Regions			
	Males	Females	Males	Females	Total males	Total females	Total persons	Per cent
Treatment :								
None	122	274	136	233	258	507	765	74·6
Not known	—	3	19	16	19	19	38	3·7
Incomplete	40	72	36	35	76	107	183	17·8
Complete	13	13	3	9	16	22	38	3·7
Refused	—	1	—	—	—	1	1	0·1
Not amenable to treatment	—	1	—	—	—	1	1	0·1
Total	*175*	*364*	*194*	*293*	*369*	*657*	*1,026*	*100·0*
Prognosis :								
Remediable	59	113	100	102	159	215	374	36·4
Not remediable	23	33	19	31	42	64	106	10·5
Doubtful	56	111	44	90	100	201	301	29·3
Treatment inadvisable on general grounds	37	107	31	70	68	177	245	23·8
Total	*175*	*364*	*194*	*293*	*369*	*657*	*1,026*	*100·0*

TABLE V

Treatment in Cases of Glaucoma

Treatment	Southern Regional Association for the Blind		North Regional Association for the Blind		Both Regions			
	Male	Female	Male	Female	Total males	Total females	Total persons	Per cent
None ..	40	62	28	39	68	101	169	32·6
Not known	—	4	6	9	6	13	19	3·7
Incomplete	11	11	3	8	14	19	33	6·3
Complete	91	102	42	62	133	164	297	57·2
Refused ..	—	1	—	—	—	1	1	0·2
Total ..	*142*	*180*	*79*	*118*	*221*	*298*	*519*	*100·0*

B. Blindness from a Different Cause in the Two Eyes

TABLE VI

Causes of Blindness Responsible for more than 1·0 per cent of Cases: Each Eye listed Separately

Cause	Southern Regional Association for the Blind				North Region Association for the Blind			
	Males		Females		Males		Females	
	No. of eyes	Per cent	No. of eyes	Per cent	No. of eyes	Per cent	No. of eyes	Per cent
Cataract	38	18·1	36	23·4	33	23·6	23	32·9
Glaucoma	16	7·6	17	11·0	8	5·7	12	17·1
Industrial injury ..	23	10·9	1	0·6	31	22·2	1	1·4
Non-industrial injury ..	30	14·3	18	11·7	14	10·0	6	8·5
War Trauma	6	2·9	3	2·0	2	1·4	2	2·9
Trauma unspecified ..	6	2·9	4	2·6	—	—	2	2·9
Sympathetic ophthalmia	14	6·7	4	2·6	5	3·6	3	4·3
Aetiology undetermined	32	15·2	31	20·1	18	12·9	10	14·3
All other causes ..	45	21·4	40	26·0	29	20·6	11	15·7
Total ..	*210*	*100·0*	*154*	*100·0*	*140*	*100·0*	*70*	*100·0*

COMPARISON OF FINDINGS IN CERTIFICATES FOR 1948 WITH THOSE FOR THE STUDY RECORDED IN THE TEXT

Table VII shows in summary form the distribution of the more significant causes in the 17,430 cases blinded by the same cause in the two eyes recorded in the text, as against the 3,537 recorded for 1948.

TABLE VII

Comparative Percentage Distribution of the more Significant Causes of Blindness (From the Same Cause in the Two Eyes) in the Series studied in the Text and the Series Recorded in Appendix II.

	17,430 cases recorded in the text	*3,537 cases recorded for 1948*
	Percentage distribution	
Cataract	24·6	29·0
Glaucoma	13·4	14·7
Myopia	10·8	8·3
Congenital, hereditary, and developmental defects ..	9·9	8·4
Syphilis:		
(a) congenital	4·3	1·1
(b) acquired	2·4	0·6
Senile macular degeneration	6·4	12·6
Iritis and iridocyclitis ..	4·7	4·3
Optic atrophy	3·5	2·3
Ophthalmia neonatorum ..	2·6	0·4
Trachoma	1·1	0·2
Specific fevers	0·8	0·3
Meningitis	0·3	0·1
Tuberculosis	0·3	0·1
Phlyctenular ophthalmia ..	0·4	0·3
All other causes	14·5	17·3
Total ..	*100·0*	*100·0*

The decline in the proportionate incidence of blindness from infectious causes is striking. That this proportionate decline represents a real diminution is suggested by the fact that the actual numbers of those blinded by these causes are low.

Printed in Great Britain under the authority of His Majesty's Stationery Office by John Wright & Sons Ltd., at the Stonebridge Press, Brislington, Bristol, 4

Wt3928/1.K.28.50/3,500

	Optic atrophy	7			7			14		
	Other	4			2			6		
		—	11	0·1	—	9	0·1	—	*20*	*0·1*
D2	Vascular diseases including cerebral vascular lesions:									
	Optic atrophy	23			17			*40*		
	Retinal lesions	104			129			*233*		
	Choroidal sclerosis	9			5			*14*		
	Other	16			20			*36*		
		—	152	2·0	—	171	1·7	—	*323*	*1·9*
D3	Diseases of central nervous system (excluding B3, B7, D4, and D5):									
	Optic atrophy	33			23			*56*		
	Other	11			*5*			*16*		
		—	44	0·6	—	28	0·3	—	*72*	*0·4*
D4	Diseases connected with pregnancy and childbirth		—	—		10	0·1		*10*	*0·1*
D5	Intracranial neoplasm:									
	Optic atrophy	52		0·7		69	0·7		*121*	*0·7*
D6	Diabetes:									
	Retinopathy	43			226			*269*		
	Optic atrophy	5			2			*7*		
	Cataract	—			1			*1*		
	Vitreous lesion	2			8			*10*		
	Iritis	1			11			*12*		
	Globe as a whole	4			19			*23*		
		—	55	0·7	—	267	2·7	—	*322*	*1·8*
D7	Nephritis		13	0·2		11	0·1		*24*	*0·1*
D8	Other general diseases:									
	Optic atrophy	5			1			*6*		
	Other	8			7			*15*		
		—	13	0·2	—	8	0·1	—	*21*	*0·1*
D9	Senile macular degeneration ..		485	6·4		626	6·3		*1,111*	*6·4*
	Total general diseases		*825*	*10·9*		*1,199*	*12·1*		*2,024*	*11·6*
E1	Aetiology undetermined, Anatomical diagnosis:									
	Optic atrophy		359	4·7		255	2·6		*614*	*3·5*
	Iritis and iridocyclitis		306	4·1		509	5·2		*815*	*4·7*
	Choroidal lesions		123	1·6		174	1·8		*297*	*1·7*
	Corneal lesions		156	2·1		241	2·4		*397*	*2·3*
	Retinal lesions		32	0·4		33	0·3		*65*	*0·4*
	Cataract		8	0·1		5	0·05		*13*	*0·07*
	Vitreous lesions		3	0·04		3	0·03		*6*	*0·03*
E2	No adequate anatomical or aetiological diagnosis		158	2·1		175	1·8		*333*	*1·9*
	Total aetiology unknown		*1,145*	*15·2*		*1,395*	*14·1*		*2,540*	*14·6*

COMPARISON OF FINDINGS IN CERTIFICATES FOR 1948 WITH THOSE FOR THE STUDY RECORDED IN THE TEXT

Table VII shows in summary form the distribution of the more significant causes in the 17,430 cases blinded by the same cause in the two eyes recorded in the text, as against the 3,537 recorded for 1948.

TABLE VII

Comparative Percentage Distribution of the more Significant Causes of Blindness (From the Same Cause in the Two Eyes) in the Series studied in the Text and the Series Recorded in Appendix II.

	17,430 cases recorded in the text	*3,537 cases recorded for 1948*
	Percentage distribution	
Cataract	24·6	29·0
Glaucoma	13·4	14·7
Myopia	10·8	8·3
Congenital, hereditary, and developmental defects ..	9·9	8·4
Syphilis:		
(a) congenital	4·3	1·1
(b) acquired	2·4	0·6
Senile macular degeneration	6·4	12·6
Iritis and iridocyclitis ..	4·7	4·3
Optic atrophy	3·5	2·3
Ophthalmia neonatorum ..	2·6	0·4
Trachoma	1·1	0·2
Specific fevers	0·8	0·3
Meningitis	0·3	0·1
Tuberculosis	0·3	0·1
Phlyctenular ophthalmia ..	0·4	0·3
All other causes	14·5	17·3
Total ..	*100·0*	*100·0*

The decline in the proportionate incidence of blindness from infectious causes is striking. That this proportionate decline represents a real diminution is suggested by the fact that the actual numbers of those blinded by these causes are low.

Printed in Great Britain under the authority of His Majesty's Stationery Office by John Wright & Sons Ltd., at the Stonebridge Press, Brislington, Bristol, 4

Wt3928/1.K.28.50/3,500

TABLE A

Causes of Blindness in Patients Blinded by the Same Cause in Both Eyes

Cause of blindness	Males		Females		Total	
	Number	Per cent	Number	Per cent	Number	Per cent
A1 Congenital, hereditary and developmental defects:						
Retinitis pigmentosa and allied conditions	313		224		537	
Cataract	240		205		445	
Choroidal defects including colobomata	61		61		122	
Optic atrophy	90		36		126	
Globe as a whole	241		208		449	
Other	16		22		38	
	961	12·7	756	7·7	1,717	9·9
A2 Myopic error:						
Choroidal degeneration	581		1,011		1,592	
Detachment	126		128		254	
Vitreous degeneration	3		3		6	
Other	6		22		28	
	716	9·5	1,164	11·8	1,880	10·8
A4 Glaucoma (Primary)	1,060	14·0	1,278	12·9	2,338	13·4
A5 Cataract (Primary, senile)	1,489	19·8	2,804	28·4	4,293	24·6
A6 Other primary defects:						
Retinal detachment	108		70		178	
Eales' disease	9		4		13	
Other	3		3		6	
	120	1·6	77	0·8	197	1·1
A7 Tumour (intraocular):						
Glioma	7		2		9	
Undetermined	4		2		6	
	11	0·1	4	0·0	15	0·1
A8 Tumour (Adnexa):						
Optic atrophy	2	0·0	3	0·0	5	0·0
Total congenital and undetermined causes	*4,359*	*57·7*	*6,086*	*61·6*	*10,445*	*59·9*
B1 Ophthalmia neonatorum	208	2·8	233	2·4	441	2·6
B2 Gonorrhoea	16	0·2	3	0·0	19	0·1
B3 Syphilis:						
(*a*) Congenital:						
Interstitial keratitis	154		367		521	
Disseminate choroiditis	58		86		144	
Optic atrophy	35		18		53	
Other	11		17		28	
	258	3·4	488	4·9	746	4·3
(*b*) Acquired:						
Optic atrophy	264		64		328	
Choroiditis	39		28		67	
Iritis	8		11		19	
Other	7		6		13	
	318	4·3	109	1·1	427	2·4
(*c*) Type not specified	3	0·0	—	—	3	0·0
B4 Trachoma	78	1·0	109	1·1	187	1·1
B6 Specific fevers	50	0·7	86	0·9	136	0·8
B7 Meningitis:						
Optic atrophy	23		23		46	
Globe as a whole	3		6		9	
	26	0·3	29	0·3	55	0·3
B8 Tuberculosis	17	0·2	35	0·4	52	0·3
B9 Phlyctenular diseases	24	0·3	46	0·5	70	0·4
Total infectious and bacterial causes	*998*	*13·2*	*1,138*	*11·6*	*2,136*	*12·3*
C1 Industrial:						
(*a*) Trauma:						
Optic atrophy	10		2		12	
Detachment	3		—		3	
Choroidal lesion	2		—		2	
Corneal lesion	8		—		8	
Globe as a whole	77		6		83	
(*b*) Disease:						
Optic atrophy	6		1		7	
	106	1·4	9	0·1	115	0·7
C2 Non-industrial:						
(*a*) Trauma:						
Optic atrophy	17		12		29	
Detachment	3		1		4	
Corneal lesion	6		4		10	
Choroidal lesion	2		1		3	
Globe as a whole	27		13		40	
(*b*) Systemic poisoning:						
Optic atrophy	16		1		17	
Other	7		—		7	
(*c*) Birth trauma:						
Globe as a whole	—		1		1	
Optic atrophy	4		1		5	
(*d*) War trauma:						
Optic atrophy	2		—		2	
Chorio-retinal lesions	5		4		9	
Other	28		9		37	
	117	1·5	47	0·5	164	0·9
C4 Trauma: aetiological type not specified	5	0·1	1	0·0	6	0·0
Total traumatic causes	*228*	*3·0*	*57*	*0·6*	*285*	*1·6*
D1 Anæmia and other blood diseases:						
Optic atrophy	7		7		14	
Other	4		2		6	
	11	0·1	9	0·1	20	0·1
D2 Vascular diseases including cerebral vascular lesions:						
Optic atrophy	23		17		40	
Retinal lesions	104		129		233	
Choroidal sclerosis	9		5		14	
Other	16		20		36	
	152	2·0	171	1·7	323	1·9
D3 Diseases of central nervous system (excluding B3, B7, D4, and D5):						
Optic atrophy	33		23		56	
Other	11		5		16	
	44	0·6	28	0·3	72	0·4
D4 Diseases connected with pregnancy and childbirth	—	—	10	0·1	10	0·1
D5 Intracranial neoplasm:						
Optic atrophy	52	0·7	69	0·7	121	0·7
D6 Diabetes:						
Retinopathy	43		226		269	
Optic atrophy	5		2		7	
Cataract	—		1		1	
Vitreous lesion	2		8		10	
Iritis	1		11		12	
Globe as a whole	4		19		23	
	55	0·7	267	2·7	322	1·8
D7 Nephritis	13	0·2	11	0·1	24	0·1
D8 Other general diseases:						
Optic atrophy	5		1		6	
Other	8		7		15	
	13	0·2	8	0·1	21	0·1
D9 Senile macular degeneration	485	6·4	626	6·3	1,111	6·4
Total general diseases	*825*	*10·9*	*1,199*	*12·1*	*2,024*	*11·6*
E1 Aetiology undetermined, Anatomical diagnosis:						
Optic atrophy	359	4·7	255	2·6	614	3·5
Iritis and iridocyclitis	306	4·1	509	5·2	815	4·7
Choroidal lesions	123	1·6	174	1·8	297	1·7
Corneal lesions	156	2·1	241	2·4	397	2·3
Retinal lesions	32	0·4	33	0·3	65	0·4
Cataract	8	0·1	5	0·05	13	0·07
Vitreous lesions	3	0·04	3	0·03	6	0·03
E2 No adequate anatomical or aetiological diagnosis	158	2·1	175	1·8	333	1·9
Totol aetiology unknown	*1,145*	*15·2*	*1,395*	*14·1*	*2,540*	*14·6*
Grond total—all causes	*7,555*	*100·0*	*9,875*	*100·0*	*17,430*	*100·0*

TABLE B

Causes of Blindness in Patients Blinded by a Different Cause in the Two Eyes (Each Eye listed Separately)

Cause of blindness	Males		Females		Total	
	Number	Per cent	Number	Per cent	Number	Per cent
A1 Congenital, hereditary and developmental defects	19	1·0	17	1·2	*36*	*1·0*
A2 Myopia	78	3·9	70	4·8	*148*	*4·3*
A4 Glaucoma	160	8·0	141	9·7	*301*	*8·8*
A5 Cataract	374	18·8	338	23·3	*712*	*20·7*
A6 Other primary defects	138	7·0	99	6·8	*237*	*6·9*
A7 Tumour—intraocular	5	0·3	5	0·3	*10*	*0·3*
A8 Tumour—adnexa	1	0·1	—	—	*1*	*0·0*
Total congenital and undetermined causes	*775*	*39·1*	*670*	*46·1*	*1,445*	*42·0*
B1 Ophthalmia neonatorum	12	0·5	10	0·6	*22*	*0·7*
B2 Gonorrhœa	3	0·2	1	0·1	*4*	*0·1*
B3 Syphilis:						
(*a*) Congenital	5	0·3	6	0·4	*11*	*0·3*
(*b*) Acquired	3	0·2	1	0·1	*4*	*0·1*
(*c*) Unspecified	1	0·1	—	—	*1*	*0·0*
B4 Trachoma	4	0·2	4	0·3	*8*	*0·2*
B6 Specific fevers	10	0·5	16	1·1	*26*	*0·8*
B7 Meningitis	—	—	1	0·1	*1*	*0·0*
B8 Tuberculosis	—	—	3	0·2	*3*	*0·1*
B9 Phlyctenular diseases	7	0·3	8	0·5	*15*	*0·5*
Total infectious and bacterial diseases	*45*	*2·3*	*50*	*3·4*	*95*	*2·8*
C1 Industrial trauma						
Optic atrophy	6		—		*6*	
Detachment	8		—		*8*	
Choroidal lesion	1		1		*2*	
Corneal lesion	13		1		*14*	
Globe as a whole	256		16		*272*	
	—	284	—	18	—	*302*
C2 (*a*) Non-industrial trauma:						
Optic atrophy	4		1		*5*	
Detachment	5		—		*5*	
Corneal lesion	7		4		*11*	
Choroidal lesion	11		9		*20*	
Globe as a whole	270		192		*462*	
	—	297	—	206	—	*503*
(*b*) Systemic poisoning		4		—		*4*
(*c*) Birth trauma		1		—		*1*
(*d*) War trauma		19		5		*24*
C3 Sympathetic ophthalmia		112		63		*175*
C4 Trauma: aetiological type not specified		31		21		*52*
						1·5
Total traumatic causes	*748*	*37·7*	*313*	*21·6*	*1,061*	*30·9*
D1 Anæmia and other blood diseases	5	0·3	2	0·1	*7*	*0·2*
D2 Vascular diseases, including cerebral vascular lesions	48	2·4	43	3·0	*89*	*2·5*
D3 Diseases of central nervous system	5	0·3	4	0·3	*10*	*0·3*
D4 Diseases connected with pregnancy and childbirth	—	—	—	—	—	—
D5 Intracranial neoplasm	—	—	1	0·1	*2*	*0·1*
D6 Diabetes	4	0·2	9	0·6	*12*	*0·3*
D7 Nephritis	—	—	2	0·1	*2*	*0·1*
D8 Other general diseases	1	0·1	1	0·1	*2*	*0·1*
D9 Senile macular degeneration	59	2·8	65	4·4	*125*	*3·6*
Total general diseases	*122*	*6·1*	*127*	*8·7*	*249*	*7·2*
E1 Aetiology undetermined, Anatomical diagnosis:						
Optic atrophy	53	2·7	29	2·0	*82*	*2·4*
Iritis and iridocyclitis	51	2·6	49	3·4	*100*	*2·9*
Choroiditis	24	1·2	16	1·1	*40*	*1·2*
Corneal lesions	48	2·4	57	3·9	*105*	*3·1*
Retinal lesions	5	0·3	7	0·5	*12*	*0·3*
Cataract	6	0·3	2	0·1	*8*	*0·2*
Vitreous lesions	2	0·1	3	0·2	*5*	*0·1*
E2 No adequate anatomical or aetiological diagnosis	105	5·2	131	9·0	*236*	*6·9*
Total aetiology unknown	*294*	*14·8*	*294*	*20·2*	*588*	*17·1*
Grand total—all causes	*1,984*	*100·0*	*1,454*	*100·0*	*3,438*	*100·0*

HV1941 Arnold, Sorsby c. 2
So69 The Causes of Blindness in
1950 England and Wales.

Date Due			

Crown Copyright Reserved

LONDON: PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE
To be purchased directly from H.M. Stationery Office at the following addresses:
York House Kingsway, London, W.C.2; 13a Castle Street, Edinburgh, 2;
39 King Street, Manchester, 2; 2 Edmund Street, Birmingham, 3;
1 St. Andrew's Crescent, Cardiff; Tower Lane, Bristol, 1;
80 Chichester Street, Belfast
OR THROUGH ANY BOOKSELLER

1950

Price 1s. 6d. net

S.O. Code No. 45-9-24